

**DIETARY DIVERSITY OF THE SCHOOL FEEDING PROGRAM
AND FACTORS INFLUENCING THE SCHOOL FEEDING
PROGRAM IN THE SLUMS OF NAIROBI, KENYA: A
PERSPECTIVE OF SCHOOL PRINCIPALS/TEACHERS IN
CHARGE**

by
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DECLARATION

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ABSTRACT

DIETARY DIVERSITY OF THE SCHOOL FEEDING PROGRAM AND FACTORS INFLUENCING THE SCHOOL FEEDING PROGRAM IN THE SLUMS OF NAIROBI, KENYA: A PERSPECTIVE OF SCHOOL PRINCIPALS/TEACHERS IN CHARGE

Introduction: The majority of the world's hungry people are found in developing countries with as many as 66 million children attending classes hungry. Hungry children are undernourished, fall ill more often, attend class less frequently, have poor concentration in class and their learning ability (cognitive development) is greatly impeded. Initiating the school feeding programs (SFP) contributes towards providing safety nets, educational and nutritional benefits for children in poverty stricken areas. In addressing the nutritional well-being of children, provision of a wide variety of diet ensures intake of essential nutrients. The aim of this study was to determine the dietary diversity of the SFP, sponsored by Feed the Children (FTC), and to assess the factors (from the perspective of school principals/teachers in charge) that influence the SFP in urban slums of Nairobi, Kenya.

Methods: A total of 78 principals/teachers in charge of the SFP were interviewed in this cross sectional descriptive study. An evaluation questionnaire was used during the interview to assess factors such as the structure and management of the program, children's satisfaction with daily portion of food, level of community involvement, availability of infrastructure and related items, and dietary diversity of the SFP basket. Concurrently with the interviews, a research assistant went round the school filling an observation checklist probing on the processes of SFP implementation in the schools.

Results: There was a high participation of over 95% of the children enrolled in the SFP. The SFP obtained a mean dietary diversity score of 3.97. There was significant differences between formal and non-formal schools in dietary diversity score ($p=0.035$). The average duration of cooking time for the SFP meals was 12 hours (SD 6.5) with significant differences between formal and non-formal schools ($p=0.0025$).

Majority (82%) of the schools served their first SFP meal very late in the day (between 12:00 – 14:00 pm). Participants further reported that schools depend largely on donors for SFP ingredients, lacked essential infrastructure and had enough space to accommodate extra stock should the SFP basket be expanded. Community involvement in the SFP was strong and could be increased. Half of the participating schools did not have vegetable gardens. There was a general lack of knowledge about agricultural practices among participants. Participants and food handlers would benefit from improving their nutrition knowledge, enabling them to act as role models for the children.

Conclusion: Supporting schools participating in the SFP in providing a more varied diet and improving infrastructure will increase diet diversity of children. Implementing nutrition education in the schools and promoting agricultural production in school vegetable gardens are potential areas for focus.

OPSOMMING

DIEETDIVERSITEIT VAN DIE SKOOLVOEDINGSPROGRAM EN FAKTORE WAT DIE SKOOLVOEDINGSPROGRAM IN DIE KROT WOONBUURTE VAN NAIROBI, KENIA, BEÏNVLOED: SKOOLHOOFDE /BEVELVOERENDE ONDERWYSERS SE PERSPEKTIEF

Inleiding: Die meerderheid honger mense in die wêreld word gevind in ontwikkelende lande en soveel as 66 miljoen kinders wat skool bywoon, is honger. Honger kinders is ondervoed, word meer dikwels siek, woon skool minder gereeld by, lei aan swak konsentrasie in die klas en hulle leer vermoë (kognitiewe ontwikkeling) word grootliks belemmer. Die vestiging van die skoolvoedingsprogramme (SVP) dra daartoe by om veiligheidsnette, opvoedkundige en voedingsvoordele vir kinders in armoedige gebiede te verskaf. Ten einde kinders se voedingswelstand aan te spreek, word die inname van noodsaaklike voedingstowwe verseker deur 'n dieet te voorsien wat 'n wye verskeidenheid bied. Hierdie studie poog om die dieetdiversiteit van die SVP, geborg deur "Feed the Children", te bepaal en faktore te ondersoek (uit die perspektief van skoolhoofde/onderwysers in beheer) wat die dieetdiversiteit van die SVP, in stedelike krot woonbuurte rondom Nairobi, Kenia, beïnvloed.

Metode: Daar was 78 skoolhoofde/onderwysers in beheer van die SVP wat ondervra was in hierdie deursnit beskrywende studie. 'n Evalueringsvraelys is gebruik tydens die onderhoud om faktore te bepaal, soos die struktuur van die program, kinders se tevredenheid met die daaglikse voedselporsies, die mate waartoe lede van die gemeenskap betrokke was, die beskikbaarheid van infrastruktuur en verwante items, asook die dieet diversiteit van die SVP mandjie. 'n Navorsingsassistent het in die skool rondgegaan en 'n waarnemingskontrole lys ingevul oor die implementeringsprosesse van die SVP in die skole.

Resultate: Daar was 'n hoë deelname van meer as 95 % van die kinders wat ingeskryf is by die SVP. Die SVP het 'n gemiddelde dieet verskeidenheidstelling van 3.97 behaal.

Daar was beduidende verskille tussen formele en nie-formele skole se dieetdiversiteitstelling ($p=0.035$). Die gemiddelde tydsduur om SFP maaltye te kook, was 12 uur (SA 6.5) met beduidende verskille tussen formele en nie-formeleskole ($p=0.0025$). Die meerderheid (82%) van die skole bedien hul eerste SVP maaltyd baie laat in die dag (tussen 12:00 – 14:00 nm). Deelnemers het verder gemeld dat skole grootliks afhanglik is van skenkers vir SFP bestanddele, het 'n tekort gehad aan noodsaaklike infrastruktuur en het genoeg spasie gehad om ekstra voorraad te akkommodeer indien die SVP mandjie uitgebrei kon word. Daar was sterk deelname van die gemeenskap in die SVP maar dit kan verder uitgebrei word. Alhoewel daar genoeg spasie beskikbaar was, het die helfte van die deelnemende skole nie groentetuine gehad nie. Oor die algemeen het deelnemers beperkte kennis gehad oor landbou praktyke. Deelnemers en voedselhanteerders sal baatvind daarby om hul voedingskennis te verbeter sodat hulle as rolmodelle vir die kinders kan optree.

Gevolgtrekking: Indien skole wat deelneem aan die SVP ondersteun word om 'n groter verskeidenheid voedsel te voorsien en die infrastruktuur te verbeter, sal die gehalte van kinders se dieetdiversiteit ook verbeter. Areas waarop potensieel gefokus kan word, is die implementering van voedingsonderrig in die skole en die bevordering van landbou produksie in skool groentetuine.

DEDICATION

To my parents and siblings: Caroline, Sharon and Faith.

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Contributions by principal researcher and fellow researchers:

The principal researcher (Solomon Mosomi Ogachi) developed the idea and the protocol. The principal researcher planned the study, undertook data collection (with the help of a research assistant), captured the data for analyses, analysed the data with the assistance of a statistician (Mr. McCaul), interpreted the data and drafted the thesis. Dr. Lombard and Mrs. Marais (Supervisors) provided input at all stages and revised the protocol and thesis.

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LIST OF ABBREVIATIONS

ADA	American Dietetic Association
AMREF	Africa Medical and Research Foundation
ASAL	Arid and Semi-Arid Lands
ASP	After School Snack Program
CAP	Consolidated Appeals Process
CED	City Education Department
DC	District Commissioner
DDS	Dietary Diversity Score
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization of the United Nations
FRAC	Food Research and Action Center
FTC	Feed the Children
GOK	Government of Kenya
IFAD	International Fund for Agricultural Development
IRIN	Integrated Regional Information Networks
KESSP	Kenya Education Sector Support Program
MAR	Mean Adequacy Ratio
M & E	Monitoring and Evaluation
MOE	Ministry of Education
NACOSTI	National Commission for Science and Technology
NSNP	National School Nutrition Program
NSLP	National School Lunch Program
PSC	South African Public Service Commission
RELMA	Regional Land Management Unit
RNI	Recommended Nutrient Intake
SA	South Africa

SBP	School Breakfast Program
SEND	Social Enterprise Development Foundation
SFP	School Feeding Program
SID	Society for International Development
SMC	School Management Committee
SSA	Sub-Saharan Africa
WHES	World Hunger Education Service
WFP	World Food Program
WHO	World Health Organization
UK	United Kingdom
UNICEF	United Nations Children's Fund
USA	United States of America
USD	United States Dollar
USDA	United States Department of Agriculture
YMCA	Young Men's Christian Association

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CHAPTER ONE: LITERATURE REVIEW

1.1 School Feeding

1.1.1 Introduction

Optimal nutrition is generally important to ensure a child's survival, growth and development.^{1,2} Investing in child nutrition has a positive impact on national and global well-being of populations since well-nourished children are able to lead healthy lives, obtain education, think clearly and critically, be empowered (especially the girl-child) and positively contribute to the development of their own communities.³ On the other hand, not having enough food leads to malnutrition (under-nutrition), hampers productivity, leads to growth failure and often contributes to increased poverty levels.^{3,4} It was estimated that between 2012 and 2014, one in nine people in the world (805 million people) did not have enough food to lead an active healthy life.⁴

According to the World Food Program (WFP, 2015) the majority (791 million people) of the world's hungry people come from developing countries and in Sub-Saharan Africa (SSA) one in four people is undernourished.^{4,5} It is estimated that approximately 100 million children (one in six), in developing countries, are underweight, out of which 66 million primary school-age children attend classes hungry across the developing world.³ In Africa alone the number of school-age children who attend classes hungry is estimated at 23 million.^{3,5} Going to school without being fed greatly impedes their learning ability. Therefore, initiating feeding program in schools is vital to mitigate the negative impact on children's education.^{6,7}

School feeding programs (SFP) have previously been given a two-fold definition by a joint publication of the World Food Program (WFP) and the World Bank Group.⁶ A SFP is defined as the "provision of food to school children" either by feeding the children at the school (in-school feeding) or by giving the children who attend school and their families parcels of the SFP ingredients to take home (take-home ration). There are three main benefits attributable to a SFP namely: nutritional benefits, educational benefits and safety nets.⁶⁻⁸

A large percentage of children who suffer from acute and chronic protein-energy malnutrition and micro-nutrient deficiencies come from developing countries.⁴ School feeding programs alone cannot improve these children's health and nutritional status.⁷ A number of complementary health and nutrition interventions are conducted along with the SFP to enhance effectiveness and efficiency in improving children's health and nutritional status. These include micro-nutrient fortification/supplementation, de-worming, provision of health and nutrition education as well as ensuring a safe and sanitary school environment.^{6,7}

Micro-nutrient fortification involves the addition of minerals and/or vitamins to food which may be under-supplied by the diet. The common micro-nutrients that are added to the diet include: iron, iodine, vitamin A, B-vitamins and zinc.⁶ Micro-nutrients may be added by the food industries during the processing stage, e.g. the WFP policy to fortify salt with iodine and oil with vitamin A (or at times vitamin D).⁷ At other times, food is fortified after cooking by adding micro-nutrient powder thus increasing the amount of micro-nutrients available in the food.⁶

Furthermore, school children, 5-14 years, are the most commonly affected age group with helminth infection (due to parasitic exposure) and are also the group where the severity of the infection is most intense. This leads to iron deficiency anaemia, poor growth and poor cognitive ability.⁷ Offering de-worming tablets once or twice annually can be integrated with the SFP. This might improve cognition, enhance nutrition status, increase active participation in school activities, reduce absenteeism and improve immune function.^{6,7}

Health and nutrition education involves conducting a series of training sessions and activities aimed at improving knowledge, attitude and behaviour among school-age children, their families, teachers, food handlers, and community members.⁸

Lastly, a safe and sanitary school environment entails ensuring each school has a clean water supply, adequate and separate sanitary facilities (separate toilet blocks for boys and girls to ensure privacy – especially for the girls) and washstands for hand washing.⁷

The SFP also acts as a social safety net⁸⁻¹³ in the short term because it targets and offers the greatest benefit to the poor by providing approximately 10% of the household annual expenditure on food per school-going child.¹³ Thus household expenditure on food is indirectly supplemented. Furthermore, since more children enrol and attend schools with the SFP, parents have more time to engage in income-generating activities.^{6,13} The long-term safety net benefit of the SFP is that it leads to increased school attendance, increased attainment of education levels as well as reduction in absenteeism.^{6,13-17} Eventually, as research shows, the children from poor socio-economic background attending schools with the SFP are more likely to complete and progress in the education ladder and thus have a higher likelihood of increased income in later years and lower overall poverty levels.⁶

Nutritional benefits attributed to a well-designed feeding program include: 1) increase in height,¹⁴ 2) increase in weight,^{14,18} 3) increased access to a nutritious meal^{6,13} and 4) reduction of micro-nutrient malnutrition such as iron and vitamin A deficiencies.^{13,19,20} The SFP, further leads to a reduction in short term hunger, improved concentration in class as well as cognitive abilities.^{6,13,14,21-23}

Access to nutritious meals also involves access to diverse food intake. A measure of dietary diversity can be implemented at household level, to establish food accessibility, and at individual level to establish nutrient adequacy. From individual dietary diversity scores, one can further establish the deficient macro/micro-nutrients in the diet.²⁴ Despite the fact that the SFP contribution to nutrition should not compete with (but rather complement) maternal and child health programs,^{6,25} the SFP can still serve as a route to enhance nutritional well-being of school children.⁸

Whereas the SFP in developed and developing countries differ in various ways, the driving force can be inferred from the primary objective in that the latter's focus is mainly on poor families and in alleviating hunger⁶ while the former mainly concentrates on curbing the increasing levels of obesity prevalence.⁸

1.1.2 School Feeding in Developed Countries

In developed countries, such as the United States of America (USA) and United Kingdom (UK), the SFP is mainly funded by the local governments.^{8,26} These countries have well developed guidelines to ensure high quality food and adequate nutrient contribution of food for improved physical and psychological benefits.^{8,26,27} Children from these countries have the option of either carrying packed lunch from home or eating school meals.²⁷ The children are also able to choose from a variety of food from the school meal food basket ranging from vegetables, fruit, starch, dairy drinks, confectioneries and snacks.²⁶ These countries have food-based standards which specify the food types/groups and the frequency in which the specified food should be provided e.g. 'bread with no added fat or oil must be provided on a daily basis'.^{26,27}

Developed countries also have nutrient-based standards that clearly outline maximum levels of sugar, sodium and fat as well as minimum levels of selected vitamins and minerals which children should obtain from daily school meals.²⁷ In Scotland for example, (since 2008) the daily recommended minimum amount of calcium that primary children were to attain from a meal obtained from school was 165 milligrams and the daily amount of fat was not to exceed 21.7 grams.²⁶

Moreover, the USA has a variety of programs such as the national school lunch program (NSLP), school breakfast program (SBP), after school snack program (ASP) and the fresh fruit and vegetable program.⁸ These programs serve to benefit and protect the health and well-being of those participating in the SFP, especially favouring children from socio-economically poor backgrounds who receive free meals or meals at a reduced price.^{8,28} These programs serve large masses of children and are available in different scales based on the number of children participating.²⁸ The NSLP has the

highest number of beneficiaries with statistics showing that in the 2008 financial year 31 million children were receiving daily lunches from the program.⁸

1.1.3 School Feeding in Developing Countries

Unfortunately, in developing countries such as Kenya and Angola, there is little government involvement and many of the SFP are funded by donors.⁶ The WFP for instance supports the SFP in more than 70 of the 108 countries classified as developing countries.^{20,29} Currently though, there are efforts for transition of the programs to be funded by the local governments.^{6,20} Other developing countries however, such as South Africa and Ghana, have their own government supported national SFP.³⁰

There are also wide differences in the way in which the SFP are carried out in the different developing countries. In South Africa for instance, there are nutritional guidelines which recommend that children should get at least 30% of their daily requirements of energy, protein, zinc, calcium and vitamin A from the SFP.³⁰ It is also recommended that children are fed by 10 am to conquer short-term hunger and to enhance learning.^{30,31}

On the other hand, Ghana lacks nutrition guidelines to inform the existing SFP. Angola has no food fortification in the SFP food baskets despite the widespread vitamin and micro-nutrient deficiencies.³⁰ Nevertheless, it is important to note that in some of the developing countries, such as Ghana and Kenya, lunch is mainly the only meal served from school.¹³ The commodities supplied as the SFP ingredients by both the government and the non-governmental organizations (NGO) depends on local availability of food and in severe drought (food unavailability) the SFP is frequently suspended.³⁰

Though the aim of most of the SFP is to provide a nutritionally-balanced meal targeting mainly the socio-economically disadvantaged in a cost-effective and sustainable way, the SFP meals are normally pre-determined and often lacks variety.⁶ In Gambia for example, the SFP ingredients provided by WFP comprises of cereal (i.e. rice), pulse

(i.e. peas) and vegetable oil.³² Because of this, meals often fall below the targets for promoting the health and well-being of poor children who hardly meet their recommended nutrient intake (RNI) and who obtain 30-90 percent of their daily requirements for energy and protein from school meals.¹³

1.1.4 School Feeding in Kenya

In Kenya, increasing intensity of drought and food shortages affect the arid and semi-arid lands (ASAL), where a third of the population lives. The Kenyan government introduced the SFP in 1979 in the form of a school milk program.^{13,33} The three primary aims of the SFP at inception were to combat the devastating consequences of childhood malnutrition, to increase school enrolment and to provide more educational opportunities to the girl-child.³⁴

This milk program became too expensive to maintain leading to a new partnership between the Kenyan Ministry of Education and the WFP. Thus, from 1980, the new SFP was implemented with a starting target of 220 000 pre-primary and primary school children.^{13,33} The WFP has continued to support the SFP in Kenya since then. The WFP participated by the provision of funding, coordinating with the government in daily logistics, participating in government-led education sector coordination meetings and facilitating training and capacity building of officers responsible for monitoring the SFP, school principals and the school management committee (SMC) members.³⁵

In 2003, free compulsory primary school education was introduced in Kenya.³⁴ The WFP expanded the SFP to urban informal settlements in an effort to reach the most vulnerable children exposed to food insecurity.¹³ This also acted as an incentive to attract children and to mitigate the high rates of absenteeism among children from poor socio-economic backgrounds.³⁴ In 2004, the urban school feeding program was introduced with 'Feed the Children (FTC)' – an international organization working in Kenya – acting as the main implementing partner on behalf of the WFP.^{13,36}

Feed the Children is an organization that was founded in 1980, with its headquarters in Oklahoma (USA); its mission is to end childhood hunger.³⁷ The organisation has been actively involved in Kenya since 1993 and administers various programs. There are currently four main programs: 1) food and nutrition – providing nutrition education, food fortification and the SFP (since 2004); 2) health and water – building of water pans for collection of rain water, construction of latrines and water tanks in schools, provision of shoes, sanitary supplies and de-worming programs; 3) education – teaching children about the prevention and management of HIV/ AIDS; and 4) livelihoods – empowering communities to start income-generating projects such as soap-making, animal and vegetable farming.³⁸

Although Kenya doesn't have a formal national SFP,³⁰ the government supports the program and has formulated policies which have the SFP as an important component in the main thematic areas. These policies are described in the 2005 policy framework for education that underscores the importance of the inclusion of school meals and encourages provision of midday meals to children, especially those from poor socio-economic backgrounds.³⁵ Other policies include the 2009 'National School Health Policy' that highlights the need for the inclusion of health interventions, such as de-worming, in schools³⁹ and the 'National Nutrition and Food Security Policy' of 2011 that advocates for enhancement and expansion of the SFP.⁴⁰ School feeding is also a main component of the 'Kenya Education Sector Support Program' (KESSP), an investment program which is an institutional framework providing a complete blueprint of development in the educational sector.^{13,35,41}

1.1.4.1 The Need for School Feeding Programs in Kenya

Kenya has a population of 45.5 million people (2014 estimates) with nearly half of the population living below the national poverty line.⁴² More than three quarters (34 million people) of the Kenyan population live in the rural areas. Half of these rural dwellers live below the poverty line whereas in urban areas, another third of the population also live below the poverty line.^{42,43} In 2015 it was reported that 18 million people (40% of the total Kenyan population) were living in extreme poverty.⁴⁴

Statistics indicate that more than 70% of the urban slums' population don't consume their daily nutritional requirements¹³ of macro-nutrients and micro-nutrients needed to maintain health and reduce the risk of contracting diseases related to dietary intake. The limited data that exists concerning research conducted in arid and semi-arid areas in Kenya shows that the main micro-nutrient deficiencies of concern in children aged 5-14 years include iron, zinc, vitamin A, vitamin B12 and riboflavin.³⁰ It was reported in 2014 that one in every three children in the country was suffering from chronic under-nutrition.⁴⁵

In Kenya, 48% of the population consists of children aged 5-19 years old.⁴¹ Nationally, 92% of primary school children (6-14 years) attend classes.^{13,30} On the contrary, in urban slums of Nairobi, 70% of the children of the same age are not enrolled in schools.^{30,35} Moreover, more than half of those who do attend primary schools in the slums don't complete their studies.³⁵

As at 2009, figures of the number of children who were beneficiaries of the SFP nationally was estimated at 1.3 million.⁴⁶ Among these, 1.2 million children were directly supported by the WFP^{13,30,35} while FTC supported approximately 50 000 children.^{36,47} It is important to note that the SFP is mainly carried out in rural areas in Kenya, where nearly 80% of the population lives and where there is high vulnerability to food insecurity exposure due to frequent and severe droughts and high poverty rates.³⁴ In urban areas, the number of the SFP beneficiaries was estimated to be 140 000 children⁴⁸ (in both the WFP and FTC-supported schools) representing 11% of the total children population benefiting from the SFP in Kenya.

1.1.4.2 The Nutritional Content of Meals Provided by School Feeding Schemes in Kenya

The SFP practice of FTC and the WFP in urban areas is 'in-school feeding'. When FTC partnered with the WFP in implementing the SFP in urban areas,³⁶ it borrowed the existing structure of the SFP ingredients and ration from the WFP. The WFP basket

contains 150g cereal (corn or bulgur wheat), 40g pulses (beans or yellow split peas), 5g vegetable oil and 3g salt per child per day.¹³ The SFP ingredients and ration provided by FTC comprises of 150g cereals (maize), 40g pulses (beans) and 5g vegetable oil per child per day.³⁶ The SFP ingredients provided by FTC is the same throughout the year while the SFP ingredients supplied to the WFP-supported schools continuously alternates between corn with beans and bulgur wheat with yellow split peas.¹³

Using the Food and Agriculture Organization of the United Nations' (FAO) food composition tables,⁴⁹ the nutrition content of the WFP basket, when bulgur wheat with yellow split peas are supplied as main components of the SFP ingredients, provides a higher nutritional value of protein and a slightly lower content of energy, carbohydrates and fats compared to when maize with beans are supplied (Table 1.1).

Table 1.1: Nutritional content of the school feeding program ingredients provided by Feed the Children and the World Food Program in primary schools in Kenya

School feeding program ingredients	Bulgur Wheat with Yellow split peas (WFP)	Maize with Beans (WFP/FTC)
Energy (calories)	683	700
Protein (grams)	27	23
Carbohydrates (grams)	133	136
Fat (grams)	4	7
Fibre (grams)	5	5
WFP – World Food Program FTC – Feed the Children		

Recommended nutrient intake has previously been defined by the FAO as “the daily intake, which meets the nutrient requirements of almost all (97.5%) apparently healthy individuals in an age and gender-specific population group”.⁵⁰ The RNI for children aged 4-18 years is as illustrated in the table below (Table 1.2).

Thus the SFP on average provides 29% of the recommended calorie intake for male children aged 14 years while at the same time meeting 40% of recommended calorie intake for children six years old.⁵¹

Although the vegetable oil provided in the above-mentioned food baskets is fortified with Vitamin A, and the salt with iodine, more can be done to reduce the high prevalence of micro-nutrient deficiencies in Kenya. Previous research indicates that the SFP can be a route to improve micro-nutrient status because it reaches a large number of beneficiaries.^{6,19} The SFP is even more effective (because children would readily accept the micro-nutrient fortifiers in food rather than taking it as medicinal tablets) in promoting health and well-being instead of micro-nutrient fortification on its own.¹⁹

Table 1.2: Recommended energy and nutrient intake (RNI) per age group

Nutrient Age	Energy (kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Riboflavin (mg)	Vitamin A (µg RE)	Zinc (mg)	Vitamin B₁₂ (µg)
4-6 yrs	1 800	24	600	10	0.6	500	10	1.2
7-9 yrs	2 400	28	700	10	0.9	700	10	1.8
10-18 yrs (male)	2 500	0.9g/kg	1 300	12	1.3	600	15	2.4
10-18 yrs (female)	2 150	0.9g/kg	1 300	15	1.0	600	12	2.4

SOURCE: *Kenya dietetics manual (2010)*⁵¹

1.1.4.3 Cost and Management of School Feeding Programs

The cost of the SFP is determined by various factors such as the type and quantity of the SFP ingredients to be supplied, location of an area and the proximity in terms of accessibility to facilities such as roads, the geography of the area (i.e. whether the region is mountainous or if the country is landlocked – the SFP cost are highest in landlocked countries) and the number of beneficiaries being fed.²⁹ When total cost contributions of the government, communities and donors are taken into account, the estimated annual average cost of the SFP in African countries per child ranges from USD 28 (in Kenya) to USD 63 (in Lesotho) with a weighted average of USD 40 per child per year.^{6,29} The donors (e.g. the WFP), the government, and communities contribute cash and in-kind to facilitate the smooth running of the SFP which involves the cost of salaries, purchase of commodities, costs involved in transporting commodities from one

area to another, supplies and other costs, such as the expense involved in facilitating storage.⁶ The cost of school feeding in Kenya is lower, compared to other African countries, because the country is more accessible (not landlocked) and more children are being fed thus lowering the cost per child due to advantageous economies of scale.²⁹

The logistical management of the SFP ingredients by FTC in Kenya involves purchasing of commodities to be used for the SFP per school term (there are three terms per year) using the annually budgeted-for and allocated money from donors.⁵² The SFP ingredients, when purchased, are then stored in a FTC warehouse and distributed to the beneficiary schools within the first two weeks of commencement of each new term. Additional stock is provided during the term as needed. On average, the number of school days per calendar year is estimated at 180 days.⁶ Feed the children only caters for one meal per school day and when schools close for holidays no food from FTC basket is served to the children. Monitoring of the SFP is normally done during school days by FTC, which also implements development projects such as improving school kitchen and sanitation facilities.⁵²

1.1.4.4 Criteria and Procedure for School Enrolment in the School Feeding Programs in Kenya

Kenya has recently, in conjunction with the WFP, developed a weighted mechanism for targeting the neediest areas to conduct the SFP which take into account education, poverty and food insecurity indicators.³⁵ The SFP targets schools with children who are vulnerable in terms of meeting their nutritional needs, children who are from poor socio-economic backgrounds and where there is low enrolment and school attendance rates.³⁰ Having partnered with WFP in provision of urban school feeding programs to the informal urban settlements,¹³ FTC mainly supplied commodities for the SFP to schools within the slums of Nairobi.³⁸

Schools that are admitted to the program must have an enrolment of more than 200 children, a kitchen and a secure food store.³⁶ The procedure for a school to be

incorporated into the program is for the relevant school (within the selected slums) to apply for implementation of the SFP. The interested schools are then selected according to availability of funds on a first-come-first-served basis.

The positive impact of the SFP program is immensely contributing on a daily basis, during school days, to the dietary needs of the children in the short-term and empowering both individuals (especially the girl-child) and communities to obtain education and break from the cycle of poverty in the long-term.^{6,34} Notwithstanding this, the SFP needs to be expanded and the basket needs to provide a greater variety of the SFP ingredients to enhance the nutritional contribution of the meals towards improving the nutritional status of the children.^{30,40}

1.2 Dietary Diversity

The global prevalence of micro-nutrient deficiency, as at 2015, is estimated at around 2 billion people⁵³ with 30% of the developing world population being micro-nutrient deficient.²⁵ These figures clearly show that micro-nutrient deficiency is a key public health problem that needs to be addressed urgently.⁵⁴⁻⁵⁸

Eating food from a wide range of food sources both in the different food groups and within a single food group ensures one receives macro- and micro-nutrients from different food items since there is not a single food containing all the nutrients.⁵⁴ A monotonous diet mainly characterized as one largely based on starchy staples is positively associated with micro-nutrient malnutrition^{55,59} and as a strategy to combat these deficiencies, varying the diet intake is recommended as the first method of approach.⁵⁴

1.2.1 Dietary Diversity and Nutrition Assessment

The World Food Summit of 1996 defined food security to “exist when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”⁶⁰ Food

security has four main elements i.e. 'food availability, food access, utilization and sustainability'.^{54,60}

Food availability ensures a constant supply of food in adequate quantities to meet energy requirements^{54,60,61} from own production, imports acquired commercially or from supplies by donors and that the food is within reach in terms of proximity.^{60,62} Food access deals with the physical and economic ability to acquire food⁵⁴ through the use of income or non-income generating resources for purchasing food or by barter trading. Food utilization deals with ensuring food is properly used by the body, there is food safety when storing and processing the food, there is good knowledge and practice of proper child care techniques and there is adequate availability of health and sanitation services.^{60,62} Lastly, sustainability deals with the availability of food of adequate quantity and quality all year round that is not affected with changes in season patterns.^{54,60}

Diet quality falls under the 'utilization' aspect and dietary diversity score (DDS) is its proxy indicator.⁶¹ Dietary diversity is "a qualitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutrient adequacy of the diet of individuals."²⁴ Dietary diversity scores are mainly calculated by counting the number of food groups/items consumed over a specified period (mostly 24 hours) without taking into account the quantity of food consumed.^{24,54} Unlike quantitative 24-hour recalls, which take longer to conduct, require a lot of skills to administer and complex software to analyse data, taking scores of dietary diversity is relatively simple, cost-effective, time-saving and regarded as a valid tool for dietary adequacy assessment especially recommended for developing countries.⁵⁴

Depending on the objectives, a person can collect dietary diversity data at household level, using the household dietary diversity score (HDDS), to measure household ability to access food.^{54,62-64} Dietary diversity data can also be collected at individual level, using the individual dietary diversity score (IDDS), to measure aspects of an individual's diet quality in terms of nutrient intake.^{24,54}

A number of studies done at individual level, show positive correlation between DDS and nutrition adequacy in the different age groups over the lifespan.^{24,54-59,65} There is also a strong correlation between child growth and DDS.⁵⁹

Nutritional status is determined by various interrelated factors at various levels of occurrence.⁶⁶ The immediate factors include dietary intake and health status, which are in turn affected by underlying factors such as a lack of adequate food security. For adequate food security, food must be readily available and effective utilization of food is enhanced by good quality diet, proper food preparation and the absence of illness, all of which are determined by basic socio-economic factors.⁶⁷

1.2.2 Determining the Dietary Diversity Score

The FAO published guidelines on measuring the DDS at individual and household level.²⁴ Although, according to the FAO guidelines, there is still no international consensus on the food groups to include while calculating the individual DDS, and the type of food groups to be counted for the DDS varies according to the purpose of a specific study, usually there are nine food groups that are commonly used to calculate the individual DDS.^{56,59} These food groups are 1) cereals/roots/tubers; 2) meat/poultry/fish; 3) dairy; 4) eggs; 5) fruit and vegetables rich in vitamin A; 6) legumes; 7) other fruit; 8) other vegetables; and 9) fats and oils.⁵⁹

With each food group consumed, a score of one point is given and the DDS is calculated by summing the number of food groups consumed in the previous 24 hours.²⁴ A diet with a DDS of less than four is normally considered to be poor in diversity and thus a reflector of low diet quality and food insecurity.⁵⁹ In a dietary diversity questionnaire, the respondent indicates the types of food consumed the previous day, starting from the earliest meal of the day, without mentioning the amount (quantity) consumed.²⁴

1.2.3 Suitability of Using a Diet Diversity Score for Children

A number of studies show a positive relationship between diet diversity and micro-nutrient and energy intake.⁵⁶ A study reviewing dietary intake of school-age children (6-19 years) in developing countries reported that dietary diversity was positively associated with improved adequacy of nutrient intake.⁶⁸ A South African study, conducted using secondary data analyses of children aged 1-8 years, also showed a strong correlation between the measure of the percentage of the whole diet's adequacy expressed as mean adequacy ratio (MAR) and DDS, showing that the DDS could be used as a gauge of adequate micro-nutrient intake.⁵⁶ Similar findings were reported in Iran, where a study conducted among adolescents showed a positive relation between DDS and energy intake.⁵⁴

1.2.4 Diet Diversity and Teachers' Perspectives

Dietary diversity is also determined by choices made based on food preferred by children which is influenced by their teachers.^{69,70} Schools provide a good environment to promote diversification of diet to healthier eating options, such as increasing fruit and vegetables intake, since a large percentage of children between 6-18 years are school going.⁶⁹ Teachers influence eating habits of children since they not only take on the role of parents at school but are also among the key stakeholders whose perceptions and decisions influence the quality of food that will be served at the school.⁷¹

As dietary practices are passed from adults to their children, it necessitates nutrition education and involvement of the parents and community in school feeding to promote positive attitudes toward healthy eating both in the school and at home.^{70,72} There are many external factors such as environment, educational levels of both teachers, parents and community members and socio-economics, that influence food choices and preferences; however a study done in Thailand showed that the only major concern of teachers when it came to school food was the content of the food basket.⁷⁰

1.3 Problem Statement

As at 2012, the percentage of the urban population living in slums in Kenya was estimated at 60-80%.⁷³ These people face chronic food insecurity and frequently limit their food consumption to only one or two meals per day.⁷⁴ Since very few of the children living in these slums attend school, the SFP acts as an incentive to increase school attendance.⁶ However, currently in Kenya, the SFP only caters for one meal (lunch) per day. The country has no nutrition guidelines for the SFP and the food basket primarily caters for macro-nutrient content.

There is a scarcity of literature assessing factors affecting the SFP, which also influences the dietary diversity of children benefiting from the SFP, from the viewpoint of school principals/teachers. The only research investigating perspectives of teachers on school food has been done in developed countries and aimed at obesity alleviation.⁶⁹⁻⁷²

The reasons for the limitations to the SFP diet are also not well documented and determining the DDS of the SFP food and outlining food groups least consumed could play a vital role in developing recommendations for increased diversity. Lastly, little has been done to compare the experiences of formal and non-formal schools in management of the SFP. These reasons thus serve as the motivation for this research.

CHAPTER TWO: METHODOLOGY

2.1 Study Aims and Objectives

2.1.1 Aim

The aim of the study was to determine the dietary diversity of the school feeding program (SFP), sponsored by Feed the Children (FTC), and to assess the factors (from the perspective of school principals/teachers in charge) that influence the SFP in urban slums of Nairobi, Kenya.

2.1.2 Objectives

The following objectives were identified to achieve the aim of the study:

- To describe the perspectives of school principals/teachers in charge regarding factors influencing the SFP of FTC-sponsored primary schools in slums around Nairobi, Kenya.
- To describe the dietary diversity of the current SFP and outline whether the contributing factor leading to limitations regarding improved diet diversity of the SFP is due to a lack of necessary infrastructure in schools or gaps in the SFP ingredients supplied by donors.
- To compare the SFP experience as described from the perspective of the school principals/teachers in charge of non-formal schools with those from formal schools.
- To identify strengths and weaknesses of the SFP practice.

2.2 Research Questions

- What is the dietary diversity of the SFP in the slums of Nairobi, Kenya?
- Which factors (from the perspective of the school principals/teachers in charge) influence the SFP in slums of Nairobi, Kenya?

2.3 Study Design

The study was conducted in two phases: Phase 1 was a descriptive cross-sectional study design with an analytical component while Phase 2 was an observational study with an analytical component.

2.3.1 Study Population

The study population comprised of school principals/teachers in charge of primary schools in urban slums of Nairobi under the SFP directly supported by FTC.

2.3.1.1 Inclusion Criteria

- Principals/teachers in charge of the SFP at all FTC supported schools.
- Acting principals/teachers in charge of the SFP at all FTC supported schools.
- Formal and non-formal schools from the eight geographic areas in Nairobi where FTC supports the SFP.

2.3.1.2 Exclusion Criteria

- Schools at which the SFP was not supported by FTC.
- Any other person in the selected schools who was not a principal/teacher in charge of the SFP.
- Schools not within the designated boundaries.

2.4 Sampling Technique

One person (either the school principal or the SFP teacher in charge) of all 78 schools, from the eight geographic areas in Nairobi, where FTC supports the SFP, was approached to participate in the study.

2.4.1 Sample Size

The sample size comprised of 78 school principals/teachers in charge of the SFP in the FTC-supported schools. Table 2.1 outlines the basic descriptive statistics of FTC schools under the SFP as at the end of January 2015.

Table 2.1: Schools whose school feeding program is supported by Feed the Children stratified according to Nairobi geographic divisions

Geographic divisions	Number of schools	Number of children
1. Dagoretti	9	2725
2. Embakasi	12	14928
3. Pumwani	7	5500
4. Kasarani	12	4368
5. Kibera	14	8357
6. Makadara	13	7152
7. Central	7	3699
8. Westlands	4	2184
Total	78	48 913

2.5 Methods of Data Collection

Before the onset of the study a permission letter (Addendum 1) was written to the chief officer (education, children and youth affairs) at the City Education Department (CED) and the head of programs at FTC, seeking permission to conduct research on school feeding in schools under their jurisdiction. After obtaining letters of approval (Addendum 2 and 3 respectively) from the two institutions the process of data collection commenced. The researcher obtained a list of telephone numbers from FTC administration of the principals of the schools with the SFP. He then contacted the principals, informed them about the research and requested for permission to visit the school, the preferred date to do the interview and whom to contact once at the school. The relevant schools were then visited and after a short briefing the school principal/teacher in charge of each school were given the consent form (Addendum 4). The principal/teacher in charge studied the consent form and after consenting to participate in the study was then requested to sign it. The venue most suitable to the participants (which in most cases happened to be their own offices) was secured for the interview. A suitable date incorporating both the principal/teacher in charge and researcher was rescheduled for participants who preferred to be interviewed at a future date.

Data was collected during January and February, 2015. Interviews were conducted 5 days per week, during school days (Monday – Friday), and during school hours (08:00 – 17:00 hours). The interviews lasted approximately 45 – 90 minutes each.

2.5.1 Instruments used for Data Collection

Data was collected via structured questionnaires and observations. The SFP questionnaire (Addendum 5) and observation check list (Addendum 6) were developed based on available literature and examples of household questionnaires (Section 2.5.1.1).

2.5.1.1 Structured Questionnaire

The SFP evaluation questionnaire was developed from a similar study conducted in South Africa (SA) evaluating the country's national school nutrition program (NSNP). The main themes of the SA study included evaluation of the NSNP in terms of organization, management and coordination, community involvement, availability of necessary infrastructure in the schools, monitoring and evaluation of the program, perceived impact and challenges involved in running the program.⁷⁵ Dietary diversity was positively correlated with food security whose main thematic concepts include food availability, access, utilization and sustainability.⁵⁴

The current study evaluating factors influencing the SFP and also determining the dietary diversity of the school food, being different from the SA study, had to modify and locally adapt the questionnaire to capture themes relevant to achieving its objectives. Thus the following key themes emerged, which influence food security and dietary diversity: food availability, food supply in terms of delivery, adequacy of food, as well as food safety in terms of preparation and service. Other themes thought necessary to be evaluated included community involvement as well as the monitoring and evaluation of the SFP.

The included schools' principals/teachers in charge of the SFP were interviewed using the newly-developed questionnaire (Addendum 5). The questionnaire had 13 sections

with different themes with a total of 59 primary questions (besides sub-questions) probing different aspects of the current practice of the SFP as outlined below (Table 2.2).

Table 2.2: Structure of the questionnaire used to interview principals/teachers in charge of the school feeding program

Section	Theme	Type of questions	Topics of questions
1	Introduction/ general section	1 open-ended 4 closed questions	Title and gender of the participant, geographic location of the school, type of the school and general roles and responsibilities of the participant.
2	Structure and management of the SFP* in schools	4 open-ended 6 closed questions	Number of children enrolled, inclusion/exclusion criteria to participate in the SFP, length of cooking, time of serving the food and duration per week when the SFP food is served.
3	Children's satisfaction with the daily portion of food	7 open-ended 6 closed questions	Children's satisfaction with quantity of food, nutrient quality of the food, preparation method of the food and complaints raised by either parents or children regarding the SFP food.
4	Delivery and packaging of the SFP ingredients'	11 open-ended 11 closed questions	Participant's satisfaction with packaging, labelling of the SFP ingredients, delivery time and quantity of the SFP ingredients, challenges and recommendations on improving the SFP ingredients' delivery.
5	Community involvement	3 closed questions	If the school involves community members in the SFP, where the members are involved and which category of members of the community are involved in the SFP.
6	Availability of school's infrastructure and related items regarding food provision	2 open-ended 15 closed questions	Availability of infrastructure used in the SFP at the school and recommendations regarding adding infrastructure that would facilitate the smooth running of the SFP.
7	Availability of additional food resources	5 open-ended 3 closed questions	Availability of school's vegetable garden project and feasible livelihood projects that could be implemented to increase food security.
8	Food preparation	2 open-ended 2 closed questions	The personnel responsible for food preparation, the area of food preparation and the method used to prepare the food.
9	Food service	2 open-ended 4 closed questions	The area of serving food, the period of time required to serve and eat food and whether there were any leftovers.
10	Food safety	7 open-ended 7 closed questions	The person serving the food and whether they had been trained on food safety and if they had recently undergone medical check-ups.
11	Monitoring	6 open-ended 2 closed questions	Internal monitoring systems of the SFP within the school and whether the participant was satisfied with the level of monitoring of the SFP done by FTC staff.

Section	Theme	Type of questions	Topics of questions
12	Perceived impact of the SFP	7 open-ended 7 closed questions	Participant's perception on the felt impact of the SFP within the school towards different factors and the reason behind the participant's answer.
13	Ingredients that could be added to the SFP	2 open-ended 2 closed questions	Participant's recommendations on how to improve the SFP and what was the school's menu.
*SFP – school feeding program			

The structured interviewer-administered questionnaire (Addendum 5) was then completed by the researcher conducting the interview. The researcher also confirmed completion accuracy of the questionnaire before ending the interview. Once a questionnaire was completed it was placed in a sealed container until data capturing.

2.5.1.2 Observation Checklist

The observation checklist (Addendum 6) structure and key themes were derived from the modified and locally-adapted questionnaire. It was used to contextualise and support information obtained from the participants. While the researcher conducted interviews, the research assistant moved round the school compound completing the observation checklist concurrently. After completing the checklist, it was also placed in a sealed container until data capturing. The checklist had eight themes/sections and a total of 23 questions from which the research assistant made observations (Table 2.3).

Table 2.3: Structure of the observation checklist used to interview principals/ teachers in charge of the school feeding program

Section	Theme	Number of questions for checklist	Topic of observations
1	Introduction/ general section	2 questions	The appropriate geographical divisional boundary of the school and whether the school was formal or non-formal.
2	Structure and management of the SFP* in schools	3 questions	The number of meals served per day, time at which the first meal is served and the number of days per week in which the children receive the SFP food.
3	Delivery and packaging of the SFP ingredients'	3 questions	The packaging and labelling of the SFP ingredients holders, as well as any additional observations and recommendations of relevance.
4	Availability of school's infrastructure and related items regarding food provision	2 questions	The presence/absence of different infrastructure in the school that is related to the SFP and also any other notable observation.
5	Availability of additional food resources	2 questions	The presence of a vegetable garden at the school and availability of space to implement a vegetable garden.
6	Food service	6 questions	Where the children ate in the school, whether the children washed their hands before eating, the length of time to serve and complete eating the SFP food and whether there were any leftovers after children had eaten.
7	Food safety	3 questions	The person serving the food and whether they had a valid medical certificate.
8	Additional SFP ingredients	2 questions	Comparisons on the planned and actual menu for the day; any observed differences were also recorded.
*SFP – school feeding program			

2.5.2 Researcher's Background and Standardisation of Research Assistant

The researcher was previously an employee of FTC, monitoring the process of implementation of the SFP in schools within the different slums of Nairobi, for a period of three and a half years. The researcher was thus well acquainted with the field of study such as the daily processes involved in implementation of the SFP, the perceived gaps or limitations and possible areas of improvement that needed further research and documentation.

The main prerequisites for research assistant were: male (due to the safety risks involved in the study area), willingness to work in the study area, full-time availability, and flexibility to move wherever requested during data collection. The language competence required of the research assistant was the ability to read and write in English.

The researcher contacted three of his close associates and informed them about the intended research, the prerequisites for a research assistant and then asked whosoever was interested and available to send his curriculum vitae (CV) via email. The criteria (namely the time and number of days per week the research assistant was to report for data collection and duties expected to carry out) were also made known to the persons contacted. The researcher answered all questions/clarifications raised by the prospective research assistants regarding the research and asked them if they had any recommendations to make. None of them made any recommendations concerning the research or the duties to be performed by the research assistant. They all showed a keen interest to take part in the study, judged by the questions and clarifications sought regarding the research. However, two of contacted persons couldn't confirm their availability in January 2015. Only one person, fitting the recruitment criteria and that was available during the time of data collection, sent his CV and was thus selected to assist in the research.

The selected research assistant was briefed during a scheduled training day, in terms of observation during school visits and the use of the observation checklist. The research assistant also accompanied the researcher during the pilot study to gauge whether he understood the designated responsibilities. A meeting was held after the pilot study to review the adequacy of the training, the experience of the research assistant during the pilot study and to make any necessary amendments before the date of data collection.

2.6 *Anticipated Risks and Precautions*

Some schools were located in geographical areas where a high incidence of mugging had been reported previously. This was regarded as a possible risk which the

researcher and research assistant could be exposed to. In order to mitigate this, the researcher and his assistant first accessed schools, in some slums, which were previously deemed safe and were then escorted by a teacher, appointed by the school principal, to the next school after conducting the interviews. In other geographical areas, where it was deemed unsafe and schools were far apart, the researcher and his assistant used motorcycles as the means of transport from one school to another.

2.7 Pilot Study

A pilot study was conducted before the actual data collection during January 2015. The data collection instruments developed for the purpose of this study, were tested.

Two of the four schools in which the SFP is sponsored by the World Food Program (WFP) in a periphery town, Ndonyo in Kiambu County, were selected as part of the pilot study. The principals/teachers in charge of these schools were then interviewed.

The WFP-sponsored schools are different from the FTC-sponsored school in terms of the items in the food basket. In the FTC-sponsored schools the food basket consists of maize, beans and oil all year round while in the WFP-sponsored schools the food items continuously alternate between bulgur, yellow split peas, oil and salt. The FTC- and the WFP-sponsored schools are similar in the way they conduct the SFP. The WFP-sponsored schools use a similar ratio of cereals, pulses and oil, and both programs offer lunch as the only meal of the day for students. Both programs target students from poor socio-economic backgrounds in the urban slums of Nairobi and are fully comparable. Information and experience that closely resembled the main study could be obtained. The pilot study used the same procedure to collect data as followed during the main study.

After the pilot study, the researcher and research assistant reviewed the clarity of the questionnaire and checklist and considered whether any adjustments were necessary. Adjustments were made to questions 19.2, 26.2 and 28.3 in the questionnaire. The relevant changes were made and then the process of data collection was undertaken.

2.8 Validity and Reliability

2.8.1 Face Validity

Face validity, “ascertains that the measure appears to be assessing the intended construct under study.”⁷⁶ To enhance Face validity the questionnaire was developed from a previously validated South African study questionnaire with some shared themes, such as community involvement, availability of necessary infrastructure in the schools, monitoring, and the evaluation of the program.⁷⁵

Face validity was also assessed during the pilot study by obtaining feedback from the participants in the pilot study about the clarity of questions asked and/or any suggestions they might have on additional questions. The recommended changes, (for instance the wording of questions 7 and 8 were changed from ‘participate in’ to ‘feed from’), were incorporated. Changes in wording were also done to question 9 and 11.1 to add to the clarity of the questions asked.

2.8.2 Content Validity

Content validity involves the scope of the study subject, whether it is adequately covered and whether the research questions are measuring the right things intended to be researched and whether the sampled population is adequate.⁷⁷ To ensure content validity the following measures were taken during compilation of the questionnaire and prior to the pilot study; four people (one principal and one teacher in charge of the SFP, and two people from FTC monitoring the SFP) were given the questionnaire to determine if it captures all aspects with regards to the SFP. Additional questions i.e. question 33, 50, 53 and 54 covering the theme on school’s infrastructure, food safety and monitoring and evaluation were added following the recommendations of FTC personnel and the SFP teachers thus enriching the Content validity of the questionnaire.

2.8.3 Reliability

Reliability involves consistency of the construct/variable understudy.⁷⁸ To ensure reliability an observation checklist was developed from the evaluation questionnaire and

complimented the data collected from the questionnaire. While the researcher was conducting interviews with the participants, the research assistant concurrently made observations within the schools and then the data collected was compared. This ensured more reliable results. All the schools sponsored by FTC were incorporated as part of the study population thus ensuring a representative sample.

2.9 Analysis of Data

2.9.1 Data Analysis

Data collected was coded and entered in an Excel database by the researcher. The database was then forwarded to the statistician appointed by Stellenbosch University (Mr Mccaul) who analysed the data using Stata 13 (2015).⁷⁹

The procedure for data analysis followed guidelines previously provided in literature.⁸⁰ Descriptive statistics were analysed as follows: continuous variables such as enrolment and cooking duration were described using means, standard deviations and interquartile ranges. Confidence intervals (95%) for means were provided to estimate population parameters. Categorical data such as title and gender of the participants were analysed using frequency distributions indicating absolute and relative counts.

Data was presented graphically using histograms and in tables.

Comparisons between variables were made. For these tests the following general analysis guidelines were followed:

- Comparisons of various parameters, such as time of first introduction of the SFP meal and community involvement, between formal and non-formal schools were performed by means of a Pearson's chi-squared test. Fisher's exact test was also conducted because small expected frequencies were observed.
- The Dietary Diversity Score (DDS) of formal and non-formal schools were compared using two-sample Wilcoxon rank-sum (Mann-Whitney U) test because the data was non-normally distributed.

In general, a p-value of <0.05 represented statistical significance.

2.10 Ethics and Legal Aspects

2.10.1 Ethics Review Committee

Ethics approval was obtained from the Health Research Ethics Committee of the Faculty Medicine and Health Sciences, Stellenbosch University, Ethics Reference #: S14/04/083 (Addendum 7). It was also obtained from Kenyatta University Ethics Review Committee, Ethics Reference #: PKU/224/E26 (Addendum 8). Furthermore, a permit to conduct the study in Kenya was obtained from the National Council for Science and Technology (NACOSTI) (Addendum 9).

Letters of approval were also obtained from the CED (Addendum 2) and a local non-governmental organization which supports the SFP in the country; FTC (Addendum 3). These letters were made available to principals/teachers in charge of the SFP, for their perusal and in order to assure them that the necessary procedures had been undertaken.

2.10.2 Informed Consent

Informed consent was obtained from the participants before data collection began. In the written informed consent form the participant reserved the right to agree/disagree to participate in the study and it was clearly stated that participants could withdraw at any time of the study even with initial consent. There were no penalties or benefits to the participants regardless of which choice they made. However, all efforts were undertaken to explain the importance of their contribution to the study.

2.10.3 Confidentiality

The names of participants and their respective schools were kept anonymous. Giving research participants code numbers was a measure taken to ensure anonymity and assure confidentiality of the information given. During reporting of the data collected, findings were reported in a general manner without specifying a particular school, i.e. schools were classified in terms of their geographic boundaries (divisions) and whether

they were formal or non-formal. These also served as measures taken to protect the identity of the schools and school principals/teachers in charge of the SFP. The key findings were also tabled and described in a clear and concise manner and the recommendations of the study were presented to each of the participating schools, FTC and CED at the end of the study.

CHAPTER THREE: RESULTS

3.1 Description of Participants

Feed the Children (FTC) sponsors the school feeding program (SFP) in 78 schools in Nairobi, Kenya, providing maize, beans and oil as SFP ingredients. All schools sponsored by FTC participated in the study and a total of 78 people were interviewed (one from each school) of which 34 (44%) were principals and 44 (56%) teachers. The gender distribution of the persons interviewed was 37 (47%) males and 41 (53%) females. The schools were located within eight of the Nairobi divisional boundaries (Table 3.1).

Table 3.1: Distribution of Feed the Children sponsored formal and non-formal primary schools (N=78) within Nairobi divisional boundaries

Divisional boundary	Formal schools n (%)	Non-formal schools n (%)	Total N (%)
	40 (51)	38 (49)	78 (100)
Dagoretti	1 (3)	8 (21)	9 (12)
Embakasi	8 (20)	4 (11)	12 (15)
Pumwani	7 (18)	0 (0)	7 (9)
Kasarani	0 (0)	12 (32)	12 (15)
Kibera	2 (5)	12 (32)	14 (18)
Makadara	13 (33)	0 (0)	13 (17)
Central	5 (13)	2 (5)	7 (9)
Westlands	4 (10)	0 (0)	4 (5)
Total	40 (100)	38 (100)	78 (100)

Schools were classified according to ownership. Formal schools were government-owned schools while non-formal schools were schools owned mainly by community groups. There were 40 (51%) formal schools and 38 (49%) non-formal schools which participated in the study. The main responsibilities of the school principals with regards to the SFP were storekeeping, rationing of the daily SFP ingredients to be cooked, receiving the SFP ingredients when they were delivered by FTC, record keeping, monitoring and supervising smooth running of the whole program. In addition to the above responsibilities, the purchasing of items to be used in the SFP was also reported by teachers in charge in some schools.

3.2 *Perspective of School Principals/Teachers in Charge on Factors Affecting the School Feeding Program*

Various factors which could limit the SFP from achieving its full potential as well as have an impact on the dietary diversity of school children benefiting from the SFP in slums around Nairobi, Kenya, were investigated. These factors include the structure and management of the SFP in schools, children's satisfaction with the daily portion of food, delivery of the SFP ingredients, community involvement in the SFP, availability of infrastructure and related items supporting hygienic food preparation, as well as the availability of additional food resources. Other factors that were investigated during the study include: method and duration of time involved in food preparation, process involved in food service, and food safety regulations observed by the schools. The monitoring of the SFP, perceived impact of the SFP and additional SFP ingredients that could be added to the current basket, were also assessed. The main differences between formal and non-formal schools were also highlighted.

3.2.1 Structure and Management of the School Feeding Program

The total number of children enrolled in all the schools sponsored by FTC, as at February 2015, was 48 913. The mean number of children per school was 627 (SD 553; ranging from 85 to 3 481). Children enrolled in non-formal schools amounted to 14 089 while in formal schools there were approximately three times more (34 824). Nearly all the children enrolled in the schools took part in the SFP program with results of 77 (99%) schools indicating that more than 95% of children were being fed from the school's food basket. Only one (1%) school had less than 95% of the enrolled children, i.e. 70%, participating in the SFP.

All children who were admitted to the FTC-sponsored schools were eligible to partake in the SFP. The children excluded from the SFP did not participate for medical reasons such as food allergies. The school's administrative personnel were the primary decision makers in deciding who was to participate in the SFP, while at the request of a parent or a doctor some children admitted in a FTC sponsored school were excluded.

Most schools placed the SFP ingredients on the cooking stove in the evening and left it to cook overnight. The duration of cooking times of meals varied from four to 20 hours with a mean cooking time of 12 hours (SD 6.5). The mean duration of cooking meals in formal schools was 14 hours (SD 6.3) while in non-formal schools it was 10 hours (SD 6.1). A two-sample Wilcoxon rank-sum (Mann Whitney) test was done and there was a significant difference in the time taken to prepare the SFP meal between formal and non-formal schools ($p=0.0025$). There were various reasons behind the length of cooking time; participants from 56 (72%) schools said that the duration of cooking time enabled the food to cook well, while participants from 16 (21%) schools said that the length of cooking time made the food soft and tender for young children. Other cited motivations, behind the cooking duration were serving freshly prepared food ($n=3$, 4%), retention of nutritive value ($n=1$, 1%), providing a ready breakfast for socio-economically underprivileged children ($n=1$, 1%) and avoiding overcooking ($n=1$, 1%).

The mean number of children per school daily participating in the SFP was 623 (SD 554). The time at which the first SFP meal was served varied; four (5%) schools first fed their children before 10:00 am, 10 (13%) schools' first meal was served between 10:00 am – 12:00 pm while the majority ($n=64$, 82%) of schools first served their children after 12:00 pm (Table 3.2).

Table 3.2: Time at which the first school feeding program meal was served in the primary schools (N=78) within Nairobi divisional boundaries

Time of first meal	Formal schools n (%)	Non-formal schools n (%)	Total N (%)
	40 (51)*	38 (49)	78 (100)
Before 10:00 am	0 (0)	4 (11)	4 (5)
Between 10:00 am – 12:00 pm	2 (5)	8 (21)	10 (13)
After 12:00 pm	38 (95)	26 (68)	64 (82)

There was a significant statistical difference (Fisher's exact test) between the time of the first meal served at formal and non-formal schools ($p=0.005$). Only non-formal schools ($n=4$, 11%) fed their children the SFP meal before 10:00 am and more non-formal schools than formal schools fed their children before 12:00 pm.

According to the participants from the FTC-sponsored schools various reasons influenced the timing of the first SFP meal. The school's timetables influenced the serving of the SFP meal to a great extent: three (4%) schools gave their children the first meal during the first break in the timetable, eight (10%) schools gave their first SFP meal during the longest break time, and 64 (82%) schools gave first meal to the children when the timetable indicated it was lunch time. Other reasons that influenced the time of first meal included increased concentration in class (n=2, 3% schools) and giving the first meal early to allow for proper digestion (n=1, 1% school).

The majority of schools (n=64, 82%) fed their children one meal daily while 14 (18%) schools provided two meals per day. Only two (5%) of the formal schools provided two meals per day. In terms of the non-formal schools, 12 (32%) provided two meals while 26 (68%) provided one. All schools fed their children five days per week (Monday – Friday).

3.2.2 Children's Satisfaction with the Daily Portion of Food

Seventy three participants (94%) believed the quantity of food served satisfied the children, while four (5%) believed they were not satisfied and one (1%) did not know. Of those believing the amount of food served satisfied the children, 28 (39%) said so because their school used the standard ratio prescribed by donors, 21 (29%) said there were leftover food, 13 (18%) observed the children, 10 (14%) listened to children's comments and one (1%) thought so because the school served two meals per day. The rest (n=5, 6%) thought that the amount of beans was not enough while others thought the allocated amount was focussed on the dietary requirements of younger children and not those in the upper primary grades.

All participants believed the children enjoyed the food served judged by the children's positive responses such as enthusiasm displayed (n=23, 29%), comments made (n=21, 27%), increased attendance rates (n=4, 5%) and because all the food was consumed (n=3, 4%). Some (n=8, 10%) reported that the children even took home the leftover food. Ten (13%) participants further believed the children considered the food a

privilege because they came from poor socio-economic background whereas nine (12%) believed it was because of efficient cooking methods (Figure 3.1).

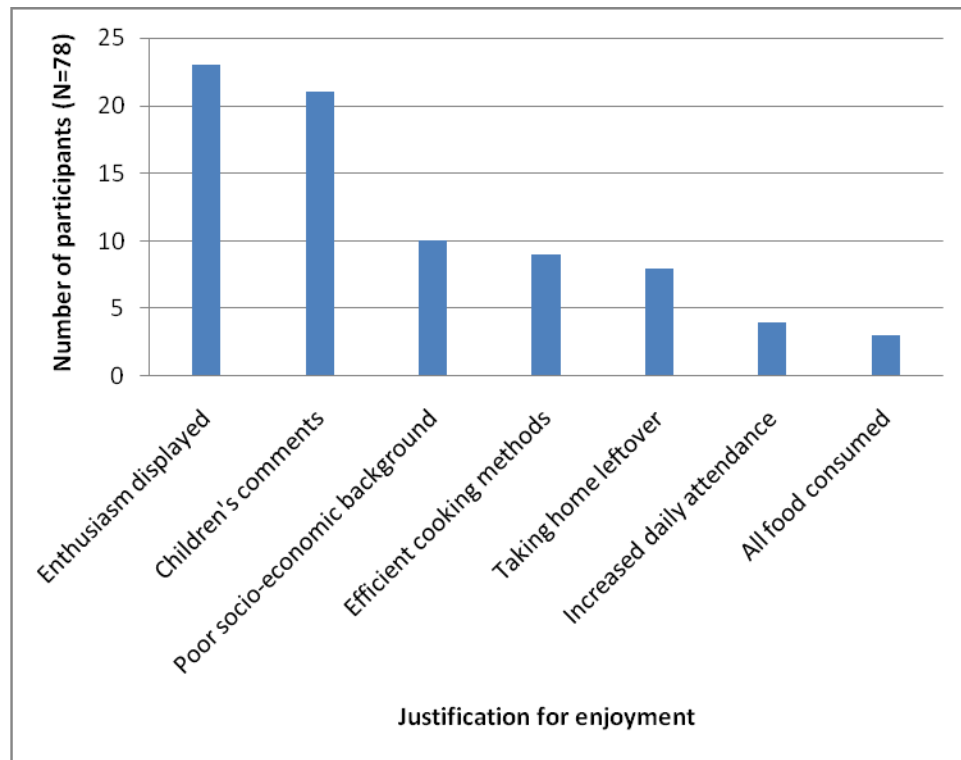


Figure 3.1: Reasons raised by participants of primary schools sponsored by Feed the Children regarding why children enjoy food served in the school feeding program (N=78)

The majority of participants 44 (56%) believed the food provided by the SFP was nutritionally adequate to satisfy the daily nutritional requirements of the children. The reasons provided include: the food contained the necessary macro-nutrients (n=22, 50%), that vegetables were added to the food basket (n=19, 43%), and that the children appeared physically healthy (n=3, 7%). Those believing the food was not nutritious (n=34, 44%) argued that the ratio of beans should be increased, vegetables and fruits should be added, and cereals should be varied.

All (N=78, 100%) participants thought the food was well prepared; some stated this was because they monitored food preparation (n=39, 50%) and often tasted it before the

children were served, while others thought the duration of cooking (n=31, 40%) was long enough, the cooks were well experienced (n=7, 9%), and because the children ate all the food (n=1, 1%).

According to the participants, children from 16 (21%) schools raised complaints, including monotony (cereals should be varied), quality of the food (at times the maize was bitter), the ratio of cereals to beans and allergic/intolerant reactions to beans. The participants also reported that parents from 16 (21%) schools lodged similar complaints to those raised by children and recommended rice as a substitute to the maize for young children.

3.2.3 Delivery and Packaging of the School Feeding Program Ingredients

No perishable food items were received as the ingredients delivered by FTC was standard in all schools i.e. maize, beans and oil, allowing for bulk deliveries. According to the participants, 38 (49%) schools received the SFP ingredients at the beginning of the school term, four (5%) at midterm, 33 (42%) when stock was depleted, and three (4%) twice or thrice per school term. One (1%) participant complained about the delivery period and recommended that food should either be delivered at the beginning of the term or at the end of the previous term.

Delivery points varied depending on security and accessibility of the schools. Sixty four (82%) schools received their stock at the school compound, seven (9%) at a slightly distant area (accessible to the FTC truck) but within the vicinity of the school, three (4%) at a distant roadside further away from the school, and two (3%) at the district commissioner's (DC) office. Teachers in charge (n=60, 77%) as opposed to principals (n=18, 23%) were more often the contact persons who received the SFP ingredients when dropped off at the delivery point. Those who received the SFP ingredients had to make arrangements for a cart or community members to transport the commodities to the school's food store if the drop-off point was not in the school compound. All schools, upon receipt of the SFP ingredients, stored it at the school's food store.

There were no complaints regarding the quantity of the SFP ingredients delivered in terms of number of stock allotted by FTC to the school and number of commodities received. Several complaints and recommendations were made by participants interviewed regarding delivery of the SFP ingredients to the schools sponsored by FTC (Table 3.3).

Although all (N=78, 100%) participants were satisfied with the way groceries were packaged, 10 (13%) participants recommended further improvements be made to the packaging. The recommendations included improving sealing quality of the sacks, (by sewing the sacks tightly), to prevent leaking/spillage and more accurate weight control of packages. However, during visual inspection of the school food stores, the researcher found that groceries were packaged and labelled appropriately.

Table 3.3: Summary of complaints and recommendations made by participants regarding delivery of the ingredients for the school feeding program

Complaints	Recommendations
Underweight sacks	Double check sacks weight
Food infested with pests	Fumigation at purchase point
Poor quality SFP ingredients beans	Purchase good quality stock e.g. large size red beans
Distant drop-off point	Use smaller trucks to deliver food,
Late arrival of food	Delivery at beginning of term or end of previous term, deliver ingredients early in the day
Poor quality of sacks	Monitor sack quality at purchase point
Poor coordination on date of delivery	Notify schools two days in advance
Preference given to formal schools	Deliver concurrently to formal and non-formal
Lack of security due to strangers offloading stock	Use FTC staff to transport food to school's store, coordinate with schools to provide security
SFP - School feeding program FTC - Feed the Children	

3.2.4 Community Involvement in the School Feeding Program

Most of the schools (n=75, 96%) involved the surrounding communities in the feeding program. The levels at which community members participated in the feeding program were as follows: participating in food preparation (n=37, 47%), serving on the school management committee (n=67, 86%), and supervising the process of SFP implementation in the schools (n=11, 14%). In addition, five (6%) participants reported that their schools received donations of additional supplies of the SFP ingredients from community members. Reportedly, 67 (86%) schools involved community members in

other supplementary services such as provision of money to be used for purchasing firewood, water and salt, as well as providing security overnight and when schools were closed. Some community members volunteered their services by serving food to the children.

There was a significant difference between formal and non-formal schools in the number of schools that involved community members in food preparation, schools in which community members served on the school management committee, and the provision of other supplementary services. There were more non-formal than formal schools that involved community members in supervision of the SFP implementation and donation of additional supplies for the SFP ingredients (Table 3.4).

Table 3.4: Levels of community involvement in the school feeding program in primary schools (N=78) sponsored by Feed the Children

Level of community involvement	Formal schools n (%)	Non-formal schools n (%)	Total N (%)	p-value
	40 (51)	38 (49)	78 (100)	
Community participation	40 (100)	35 (92)	75 (96)	0.11
Food preparation	29 (73)	8 (21)	37 (47)	0.001*
School management committee	38 (95)	29 (76)	67 (86)	0.02*
Supervision	5 (13)	6 (16)	11 (14)	0.75
Supply	1 (3)	4 (11)	5 (6)	0.20
Other supplementary services	38 (95)	29 (76)	67 (86)	0.02*
*Fisher's exact statistical significant difference $p < 0.05$				

The formal and non-formal schools were similar in the type of community members involved in the SFP. The majority of the schools (n=74, 95%) involved parents in the SFP, whereas only four (5%) schools involved religious groups. Local businesses and government hardly participated in the SFP. Three (4%) schools further included other local and international non-governmental organizations (NGOs) who occasionally donated additional supplies of the SFP ingredients (Table 3.5).

Table 3.5: Type of community members involved in the school feeding program in primary schools (N=78) sponsored by Feed the Children

Type of community members	Formal schools n (%)	Non-formal schools n (%)	Total N (%)	P value
	40 (51)	38 (49)	78 (100)	-
Parents	37 (93)	37 (97)	74 (95)	0.62
Religious groups	2 (5)	2 (5)	4 (5)	1.00
Local businesses	0 (0)	0 (0)	0 (0)	-
Local government	0 (0)	1 (3)	1 (1)	0.49
Other	0 (0)	3 (8)	3 (4)	0.24
-No tests were done due to nature of the data				

3.2.5 Infrastructure and Related Items Regarding Food Provision

All participants (N=78, 100%) reported the availability of extra storage space for groceries, fruits and vegetables, perishables, and frozen food. Observations made at the schools supported this, although there was a general lack of equipment (such as refrigerators) to store perishables for a longer period. Sixty eight (87%) schools had electricity available. Most of the schools (n=73, 94%) used an energy-saving *jiko* (fuel-efficient stove) for food preparation. The rest of the schools (n=5, 6%) used the traditional method of food preparation i.e. open fire. None of the schools had a microwave.

In terms of other resources supporting hygienic food preparation, it was found that all schools (N=78, 100%) had water supply (water tanks) as well as toilet facilities, while 66 (85%) had functioning hand washing facilities (water tap with sink and soap). It's worth noting that although all the schools reported having the resources supporting hygienic food preparation, it was not available in adequate quantities in other schools. There was no significant difference in terms of availability of infrastructure between formal and non-formal schools. However, formal schools had more of the infrastructure and related items under study.

When referring to other items that may have an impact on the provision of food to children, it was found that all (N=78, 100%) schools had adequate personnel (food handlers), 53 (68%) schools had buckets for serving food, while 12 (15%) schools

provided plates and spoons. The remaining schools (n=66, 85%) expected children to provide their own utensils (Table 3.6).

Table 3.6: Primary schools (N=78) infrastructure and related items supporting the school feeding program within Nairobi divisional boundaries

Items	Formal schools n (%)	Non-formal schools n (%)	Total N (%)	P value
	40 (51)	38 (49)	78 (100)	-
Space available to store ingredients				
Groceries space	40 (100)	38 (100)	78 (100)	-
Fruits and Vegetables space	40 (100)	38 (100)	78 (100)	-
Perishables space	40 (100)	38 (100)	78 (100)	-
Frozen food space	40 (100)	38 (100)	78 (100)	-
Other resources supporting hygienic food preparation and serving				
Refrigerators	3 (8)	0 (0)	3 (4)	0.24
Energy-saving <i>jiko</i>	39 (98)	34 (89)	73 (94)	0.20
Microwave	0 (0)	0 (0)	0 (0)	-
Toilet Facilities	40 (100)	38 (100)	78 (100)	-
Hand washing facilities	36 (90)	30 (79)	66 (85)	0.22
Water tank	40 (100)	38 (100)	78 (100)	-
Electricity	36 (90)	32 (84)	68 (87)	0.51
Personnel	40 (100)	38 (100)	78 (100)	-
Serving buckets	28 (70)	25 (66)	53 (68)	0.81
Plates and spoons	8 (20)	4 (11)	12 (15)	0.35
-No test were done due to nature of the data				

The participants were asked to name, in order of priority, three types of infrastructure/facilities that their school would require to facilitate the smooth running of the SFP. There was little difference between the four items listed most frequently under the three categories of infrastructure. The need for a dining hall (n=15, 19%), water tanks (n=9, 12%) and hand washing facilities (n=9, 12%), was mentioned by most participants in the first category of priority items. In the second category of needed items, the top priority identified, was the acquisition of a new energy-saving *jiko* (fuel-efficient stove) (n=12, 15%). The addition of a modern kitchen (n=6, 8%) was the second priority in the second category. The rest of the participants did not list any item, or whatever item their school required, was listed infrequently. There were three (4%) participants that made three different recommendations concerning infrastructure i.e. their energy-saving *jiko* (fuel-efficient stove) to be repaired, the toilets to be built in

storeys so as to maximize the limited space available for construction, and to tar the school compound to avoid dust.

3.2.6 Availability of Additional Food Resources

Only half (n=39, 50%) of the schools reported having a functional vegetable garden. These schools were equally represented in the formal and non-formal groups. Recommendations made by the participants on improving vegetable gardens included expanding the gardens, sponsoring the schools to acquire irrigation facilities, training on proper food gardening practices, involving the children in the gardening, using skilled labour, and assisting the schools to acquire greenhouses. There were a myriad of challenges raised by the participants, which faced the schools that had gardens. These include the changing weather patterns, lack of security or community members stealing garden produce, lack of water, pest infestation of the crops, lack of capital to purchase essential farm input (such as fertilizer and farm equipment), lack of personnel or unskilled labour, stray animals feeding on the crops, and limited space to expand production.

Among the 39 (50%) schools that didn't have a functional vegetable garden, 25 (64%) had space available. Of those with space, only one participant did not indicate a desire to have a vegetable garden. Among the schools that did not have vegetable gardens, several reasons were raised by the participants why their schools lacked gardens. These include lack of space in the school, lack of knowledge on agricultural production, high levels of insecurity posed by community members, and materials for construction of other school facilities was placed where the garden should have been.

The participants mentioned that the main feasible livelihood projects that could be carried out in the schools include animal husbandry (mainly poultry, cattle, fish and rabbit-keeping), fruit gardening, tree planting, growing of mushrooms, and greenhouse food gardening. Others said that their schools could plant vegetables in sacks fitted with soil (sack/storey gardening) due to minimal space in the schools, purchase a maize mill machine to generate income for the school, initiate a bakery and/or make soap for sale.

3.2.7 Food Preparation

In all 78 (100%) schools, food was prepared in the kitchen by employed cooks who used boiling as the method of food preparation.

3.2.8 Food Service

Food was served to children in three different areas mainly: classrooms (n=44, 56%), dining halls (n=5, 6%) and in the open field (n=29, 37%). Children in 77 (99%) schools washed their hands before eating. The serving period ranged from less than 30 minutes (n=41, 53%) to one hour (n=37, 47%).

3.2.9 Food Safety

In the majority (n=41, 53%) of schools, cooks were responsible for serving the food while the remainder of the schools either used teachers (n=5, 6%), the children themselves (n=30, 38%), other persons such as Catholic Church brothers (n=1, 1%), or community women (n=1, 1%). Food handlers in 58 (74%) schools received training in food safety. Only two (3%) participants felt the training was insufficient.

Participants recommended that the training should be done more frequently to cater especially for the high turnover of food handlers, or that FTC should partner with other organizations offering similar training such as Africa Medical and Research Foundation (AMREF) and Young Men's Christian Association (YMCA). Other recommendations included encouraging exchange programs for best practice, advance communication to schools concerning the training, training more persons in the schools and covering topics on hygiene, as well as food management.

At the time of data collection food handlers from 45 (58%) schools had undergone a medical check-up in a government-owned health facility and possessed a six-month valid medical certificate. The participants whose schools were non-compliant said their schools had just opened and the certificates of the food handlers had recently expired,

or new food handlers had been recently employed. However, they said plans were underway to ensure the food handlers would undergo medical check-up.

All schools served their food warm though the precise temperatures of food were not taken before serving as the schools didn't have food thermometers. The energy-saving *jiko* or the traditional means of food preparation was used to keep the food warm until the time for serving the meal arrived. When the participants were asked on how to improve food warming method, four (5%) participants from schools using traditional means of food preparation requested for assistance in acquiring the energy-saving *jiko*.

3.2.10 Monitoring of the School Feeding Program

All schools had internal monitoring systems and the implementation of the SFP was monitored by various role players: the principals, deputy principals, teachers, school management committee, school's director, students, storekeeper and/or cooks. The participants' recommendations on improving internal monitoring included training more than two teachers per school and involving students in the SFP monitoring.

All participants believed that external monitoring done by FTC staff was efficient because it was done regularly, the FTC staff arrived at the schools at unpredictable intervals (hence the school always had to be alert and keep the records updated), the staff were courteous and would respond as soon as possible to issues raised by the schools. The participants also reported that the monitoring efficiency was enhanced by FTC staff conducting a wide scope of monitoring of the SFP ranging from the school's store, school's records, to food preparation in the kitchen.

The participants made several recommendations on improving monitoring. These include: having monthly meetings with schools' administration to identify emerging challenges, monitoring projects initiated by schools, monitoring hygiene of food handlers, maintaining courteous communication with the school personnel at all times, and FTC staff to monitor fewer schools but more intensively.

3.2.11 Perceived Impact of the School Feeding Program

The participants were asked to rate statements about the perceived impact of the SFP (Table 3.7) on various factors using a four-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (4).

- All but four (5%) participants were in agreement that the SFP had a positive impact in increasing enrolment because many students were newly admitted and some schools had a consistent increase in enrolment since the inception of the program. The four participants who disagreed said other factors such as good performance and sponsorship grants offered to children had influenced an increase in enrolment rather than the SFP itself.
- Seventy seven (99%) participants agreed that the SFP had increased the daily attendance. The reasons justifying the rating on daily attendance were the minimal absenteeism and high daily retention in schools since the inception of the SFP.
- The participants positively rated the role of the SFP in increasing cognitive performance of the children because the food helped to increase children's academic performance, concentration and active participation in class.
- Reportedly, the SFP also had a positive impact by increasing children's socialization skills. The SFP helped to boost the children's interaction with their peers and teachers, the children sat in groups during the lunch hours, receiving similar meals fostered some sense of unity and helped to increase the children's esteem.
- The SFP helped to increase children's extracurricular activities by making them more active in games and increasing their participation in school clubs such as health club activities.
- The participants also said the SFP had helped to improve punctuality and many children arrived on time in school and especially the afternoon classes began on time. Those who disagreed said the SFP had a minimal impact in improving punctuality.

- Another benefit of the SFP was that it helped to improve the health of the children because the food offered was balanced, contained the necessary macro-nutrients, was offered regularly (five days per week), and was high in energy. Moreover, the participants observed that children who were malnourished before the initiation of the SFP were now healthy in appearance and reported cases of sickness were low. Participants who disagreed that the SFP had helped improve the children's health said the food was monotonous and not balanced.

Additionally, the participants said the de-worming program accompanying the SFP food improved the health of the children.

Table 3.7: Perceived impact of school feeding program according to participants (N=78) from primary schools sponsored by Feed the Children

The role of the SFP	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly agree (4)	Total
	n (%)	n (%)	n (%)	n (%)	N (%)
Increasing enrolment	0 (0)	4 (5)	30 (38)	44 (56)	78 (99)
Increasing daily attendance	0 (0)	1 (1)	29 (37)	48 (62)	78 (100)
Increasing cognitive performance	0 (0)	2 (3)	32 (41)	44 (56)	78 (100)
Increasing socialization	0 (0)	3 (4)	31 (40)	44 (56)	78 (100)
Increasing extracurricular activities	0 (0)	1 (1)	25 (32)	52 (67)	78 (100)
Improving health	0 (0)	4 (5)	28 (36)	46 (59)	78 (100)
Increasing punctuality	0 (0)	3 (4)	24 (31)	51 (65)	78 (100)
SFP - School feeding program					

3.2.12 Additional School Feeding Program Ingredients that could be added to the Current Basket

The participants had different preferences for the SFP ingredients that could be added to the current basket to enhance nutritional adequacy: milk (n=28, 36%), vegetables (n=26, 33%), fruit (n=23, 30%). One (1%) participant from a formal school specifically preferred the addition of rice to the ingredients of the SFP basket. More participants

from non-formal schools (n=15, 39%) requested the addition of vegetables to the food basket (Table 3.8).

Table 3.8: Additional school feeding program ingredients preferred by participants' (N=78) to be added to the current basket

SFP ingredient	Formal schools n (%)	Non-formal schools n (%)	Total N (%)
	40 (51)	38 (49)	78 (100)
Milk	15 (38)	13 (34)	28 (36)
Vegetables	11 (28)	15 (39)	26 (33)
Fruit	13 (33)	10 (26)	23 (30)
Other	1 (3)	0 (0)	1 (1)
SFP - School feeding program			

The participants also had different preferences concerning their school's ability to store the SFP items in case they were added to the current basket. From participants' perspectives, 38 (49%) schools could easily store milk, vegetables (n=24, 31% schools) and fruits (n=14, 18% schools), while 2 (5%) formal schools were most comfortable to store 'other' food items (i.e. rice and soy beans) (Table 3.9).

Table 3.9: Additional school feeding program ingredients preferred by participants (N=78) that could be easily stored at primary schools

SFP ingredient	Formal schools n (%)	Non-formal schools n (%)	Total N (%)
	40 (51)	38 (49)	78 (100)
Milk	21 (53)	17 (45)	38 (49)
Vegetables	9 (23)	15 (39)	24 (31)
Fruits	8 (20)	6 (16)	14 (18)
Other	2 (5)	0 (0)	2 (3)
SFP - School feeding program			

3.3 Dietary Diversity of the School Feeding Program Basket

All schools (100%) offered food from the three food groups according to the SFP basket supplied by FTC: the cereals/roots/tubers, legumes and oils food groups. The contribution of the SFP basket to dietary diversity varied in the different schools depending on the type of the additional SFP ingredients provided by other donors.

Additional food groups were offered to a limited extent in all schools: Vitamin A rich fruit and vegetables (n=20, 26% schools) and vegetables not rich in Vitamin A (n=51, 65%).

The following food groups were offered additionally in non-formal schools only: fruits not rich in Vitamin A (n=4, 11%) and dairy (n=1, 3%). None of the schools offered food from two food groups: meat/poultry/fish food group and eggs (Table 3.10). There was a significant difference between formal and non-formal schools in the fruits not rich in Vitamin A food group (p=0.05).

The mean dietary diversity score (DDS) for all the schools was 3.97. The mean DDS for formal schools was lower (3.8, SD 0.8) than non-formal schools (4.2, SD 0.9). When a two-sample Wilcoxon rank-sum (Mann-Whitney) test was done comparing the DDS in formal and non-formal schools there was a significant difference (p=0.0351).

Table 3.10: Dietary diversity of the school feeding program food basket in formal and non-formal primary schools (N=78) according to nine food groups

Food group	Formal schools n (%)	Non-formal schools n (%)	Total N (%)	P value
	40 (51)	38 (49)	78 (100)	
Cereals/roots/tubers	40 (100)	38 (100)	78 (100)	-
Fruit and vegetables - Vit A-rich	8 (20)	12 (32)	20 (26)	0.30
Fruit-not Vit A rich	0 (0)	4 (11)	4 (5)	0.05*
Vegetables-not Vit A-rich	23 (58)	28 (74)	51 (65)	0.16
Legumes	40 (100)	38 (100)	78 (100)	-
Oil/fats	40 (100)	38 (100)	78 (100)	-
Meat/fish/poultry	0 (0)	0 (0)	0	-
Dairy	0 (0)	1 (3)	1 (1)	0.49
Eggs	0 (0)	0 (0)	0 (0)	-
*Fisher's exact statistical significant difference p<0.05				
-No test were done due to nature of the data				

3.4 Recommendations made by Participants on Improving the School Feeding Program

When participants were asked to give recommendations on improving the SFP in general, the following aspects were reported: assisting financially in infrastructure construction, as well as increasing diversity/variety of the SFP ingredients supplied within food groups (e.g. alternating between rice, bulgur and maize) and among food groups (e.g. including fruit and vegetables). They also recommended that the schools be assisted with the identification and funding of feasible livelihood projects to support the SFP, building the capacity of teachers/food handlers by providing relevant training,

and that best practice should be rewarded. Furthermore, it was proposed that the schools be assisted in facilitating wages for food handlers, donors to consider including (as part of the SFP) breakfast/mid-morning snack (e.g. by providing porridge items), and importantly, the continuation of the program when schools have closed for holidays.

CHAPTER FOUR: DISCUSSION

4.1 Introduction

The findings of the research will be discussed according to the study objectives as stated in chapter two (methodology), page 19. The discussion will endeavour to answer the research questions: 1. What is the dietary diversity of the SFP in the slums of Nairobi, Kenya? 2. Which factors (from the perspective of the school principals/teachers in charge) influence the SFP in slums of Nairobi, Kenya?

Feed the Children (FTC) is a non-governmental organization (NGO) that sponsors the SFP in 78 schools in Nairobi, Kenya. The schools receive maize, beans and oil as the ingredients to be used for preparing meals for school children during school days. There is no variation in the SFP ingredients throughout the year. The monotony of the diet was a major contributing factor that led to the necessity of this study to investigate the implications and practical recommendations for improving the program.

4.2 School Feeding Program and Dietary Diversity

School feeding programs act as safety nets, offer educational and nutritional benefits to the children who are beneficiaries of the program.⁶ The finding of this study was that nearly all the children enrolled in the FTC sponsored schools in slums of Nairobi, Kenya, participated in the SFP. Previous studies conducted in developing countries^{23,81} and developed countries^{28,82-84} report similar results of high student participation in school feeding programs. Interventions aimed at improving the diet quality of the SFP will thus positively impact the health and nutrition outcomes of a large proportion of the children benefiting from the SFP. Research previously conducted in a developing country in Africa reported that some children depend on the SFP for their only meal of the day, and increasing the variety of the school food will go a long way in improving their nutrient intake.⁸⁵

Dietary diversity score (DDS) is frequently used at the individual level to reflect nutrient adequacy (macro- and micro-nutrient intake) and thus diet quality.⁸⁶ Among children 5-15 years, a DDS of four is considered the minimum acceptable level of dietary diversity to provide an adequate nutrient intake.⁸⁷ A DDS count of less than four, when counting

nine food groups, is considered an indicator of poor dietary diversity and thus poor nutrient security.⁵⁹ Inadequate intake of micro-nutrients among children is associated with poor growth, poor appetite and a predisposition to infectious diseases such as diarrhoea and respiratory infections.⁵⁶ Poorly nourished children fall ill more often and attend classes less frequently, which impacts negatively on their learning ability.⁸⁵

The results of this study showed that the average DDS of all the FTC-sponsored schools, when counting scores of nine food groups, was less than four. The children from the FTC-sponsored schools hardly consumed food from animal sources and Vitamin A rich fruits and vegetables. Literature provides good examples of practical solutions to solving the problem of inadequate dietary diversity in other developing countries. In Nicaragua, linking the SFP with local farmers and purchasing the SFP produce from the farmers helped to increase the dietary diversity of the school meals since the children ate more varied food such as eggs, fruits and vegetables.⁸⁸ Literature further shows that linking SFP with local farmers helps in development of the local economy since the small-scale farmers gain access to an outlet for their produce and earn an income.⁸⁹ These farmers are thus offered the opportunity to break from the cycle of poverty and hunger and to use the money to purchase more nutritious food for their families.

In Kenya, organizations such as 'Bioversity International' promote agricultural production of plant species with the highest levels of essential micronutrients e.g. the banana variety with the highest level of Vitamin A.⁹⁰ Partnering with such organizations and purchasing agricultural produce from the local farmers could thus strengthen livelihoods and enhance purchasing of food of the highest nutritional value as well as increasing dietary diversity of the school food.

4.3 School Feeding Program and Dietary Diversity Limitations

Various factors which may limit the SFP from achieving its full potential and which also impact on dietary diversity that were investigated in this study, include: i) monotony of the SFP food, ii) diet quality of the SFP food, iii) timing of the SFP meal, iv) food safety

practices, v) palatability of the food, vi) availability of additional food resources, vii) delivery systems of the SFP ingredients, viii) community participation in the SFP ix) availability of infrastructure and related items supporting hygienic food preparation, and x) monitoring of the SFP

4.3.1 Monotony of the School Feeding Program Food

Participants of this study reported that children raised complaints of food monotony. The cycle of food monotony can be broken by linking the SFP to local farmers. In Nicaragua, purchasing of eggs, fruits and vegetables, for the SFP, from local farmers helped to break the monotony of the SFP menu and as a result led to an increase in food intake among the school children.⁸⁸ Inventive food preparation techniques such as grinding maize to flour and using the flour to prepare a different type of food could also help in breaking the monotony. Promoting school vegetable gardens, as will be discussed in the subsequent sections below, could also provide more options for food handlers to prepare different menu items.

4.3.2 Diet Quality of the School Feeding Program Food

Diet quality deals with the ability of individuals to meet their daily nutrition requirements (including micro-nutrients).⁶¹ It is best achieved by consuming a variety of foods.⁵⁴ Thus dietary diversity is a proxy indicator of diet quality.⁶¹ The results of the current research reporting a mean DDS of less than four was thus an indicator of poor diet quality. Literature also provides examples of best practices on how to improve diet quality in developing countries. In Latin American countries, implementation of 'sustainable school activities' helped to strengthen and improve the quality of food provided by the SFP.^{88,91} The Latin American project involved coordinating different agencies and ministries of the government, food and nutrition education, improving infrastructure used in school feeding, and purchasing produce directly from farmers.⁹¹ Including foods such as oilseeds, fruits and vegetables not only enhances nutritional value of food but also increases food intake.⁹² Feed the Children could also make a provision for purchasing dried and/or tinned vegetables thus aiding in improving the quality of diet intake among children.

4.3.3 Timing of the School Feeding Program Meal

The finding of this research was that more than three-quarters of the schools served only one meal per day. Furthermore, the first meal was served very late, between 12:00 to 14:00 pm. Literature reports that 66 million school children in developing countries go to school hungry (World Food Program, 2009 report).⁹³ Additionally, in low- and middle-income countries, schools that start the SFP have previously recorded figures of as high as 63% of enrolled children going to school hungry.⁹⁴ Initiating the SFP meal late in the day could thus have a negative impact on learning and cognitive ability considering that a hungry child can't concentrate and perform complex tasks.^{94,95} Most of the schools in this study cooked their food overnight and thus it seems logistically possible to serve food earlier in the day. Initiating school meals in good time helps to alleviate short-term hunger⁹⁵ and this is preferably achieved through inclusion of breakfast or mid-morning snacks which also helps to improve cognition, short-term memory and concentration.⁹⁶ In South Africa's SFP for instance, recommendations are that the first SFP meal should be served before 10:00 am if the school is starting at 7:00 am.³¹

Various reasons contributed to serving the SFP meal late. Firstly, the exceptional long duration of food preparation (mean of 12 hours) in all the participating schools played a large part. It was attributed to the fact that cooking large quantities of the SFP ingredients required long cooking duration. Secondly, the quality of the ingredients influence cooking time since poor quality ingredients would often require longer cooking time to soften the food. Moreover, the type of commodities (such as maize and beans) supplied as the SFP ingredients also determined the amount of time taken to have the SFP food cooked. Other factors include the nature of cooking facilities i.e. whether it was open fire or fuel-efficient stoves as well as processes undertaken in preparation of the SFP ingredients before cooking e.g. if the ingredients were soaked. Recommendations made by the World Bank Group and the WFP includes the use of fuel-efficient stoves to minimize environment degradation as a result of using excessive fuel and to shorten cooking time.^{6,35} Soaking the SFP ingredients in water overnight or

replacing the current commodities supplied with others that take shorter time to cook e.g. rice and *mung* beans/green grams, will also reduce cooking time.³⁵

4.3.4 Food Safety Practices and Nutritional Knowledge

Nearly three-quarters of the participants reported that the motivation behind the long cooking duration was that it enabled the food to cook well, one participant cited the retention of nutritive value of the food. Furthermore, because FTC provided a limited variety of the SFP commodities (maize, beans and oil) as the ingredients for the food basket throughout the year, more than half of the participants believed that this was nutritionally adequate to meet the daily nutritional requirements of the children. Although the participants also reported that the food was served warm, knowledge and implementation of recommended food safety temperatures seems not to have been practised since the food that cooked overnight was rarely reheated. A misconception regarding cooking duration, nutrition retention, children's nutritional requirements and food safety practices is thus highlighted, showing a need for training on food preparation techniques and nutrition education among the teachers and food handlers. Experiences from the World Health Organization (WHO) pilot project in several African countries on food safety education provides key lessons on best practice of knowledge transfer to teachers and food handlers.⁹⁷ Moreover, WHO has also developed 'a five keys to safer food' manual that recommends cooked food should not be kept at room temperature for more than two hours and also that food should be kept at a temperature of beyond 60 °C before serving so as to slow down/stop microbial growth.⁹⁸

Teachers are children's role models in school⁷¹ and their level of knowledge influence children's food choices and preferences.⁷⁰ A study previously conducted in Kenya reported that in Kenya, the levels of nutritional knowledge among primary school teachers and children are low as a result of limited information resources, a narrow scope of nutrition topics covered in class and little time for nutrition education allocated in the curriculum.⁹⁹ Moreover, a survey done in 55 countries worldwide reported the need for nutrition-related materials and teacher training in primary schools.¹⁰⁰ Evidence from the Zambia Education in Basic Schools (NEBS) project showed that teacher

training and nutrition education helps to increase knowledge, attitude and behaviour of teachers and the benefits are passed on to the children.¹⁰¹ Based on these study results, there may be a need to determine the teachers' nutritional knowledge, specifically on aspects such as dietary diversity, with an aim to invest in nutrition education in schools and teacher training.

4.3.5 Palatability of the Food

The participants also reported that, despite the long duration of food preparation, some parents had raised complaints that maize was especially difficult for the younger children to chew (unpalatable) and were requesting rice as a substitute. Practically, FTC could increase the variety within food groups i.e. providing both rice and maize as the SFP ingredients so that they can be alternated on the menu. Palatability depends on the food's taste, smell, texture and appearance.¹⁰² It may be enhanced by using innovative food preparation methods such as different seasonings and combining different foods within a food group e.g. maize with rice.¹⁰³ Practically, FTC could provide more training to the food handlers on food preparation techniques that would make the SFP food more palatable especially to the young children.

4.3.6 Availability of Additional Food Resources

Dietary diversification of the SFP could also be enhanced by using agricultural produce from school vegetable gardens. Moreover, school vegetable gardens also provide a learning experience to children on food production and nutrition.⁶ Even though half of the schools in this study lacked vegetable gardens, two-thirds of the schools without gardens had space available to start a vegetable garden. The establishment of school vegetable gardens seems attainable as nearly all the participants in these schools expressed the desire to have vegetable gardens at their schools.

Mixed opinions concerning the value of establishing school vegetable gardens for the SFP exist in literature. Some researchers report that using school gardens for agricultural production is time-consuming and an inappropriate use of the educational system.^{6,81} On the other hand, evidence exists of successful implementation and

integration of school vegetable gardens with the school curriculum in developing countries.^{35,88}

A number of challenges regarding establishing school vegetable gardens, previously documented and also applicable to the context of the current study findings, include a lack of expertise among teachers regarding agricultural production, insecurity, and a lack of water.⁸¹ Literature provides good learning experience of how to address the problem of a lack of agricultural knowledge among students, teachers, parents and community members. In Uganda demonstration gardens were established in schools, by a local NGO, which brought together farmers, parents, children and teachers to learn from agricultural officers as they practically farmed in school. As a result, there was increased community participation, knowledge concerning farming was transferred to members of the community, and simultaneously produce from the farms benefited the schools.¹⁰⁴ Insecurity could be addressed by increased community ownership of school programs as well as proper fencing of the vegetable garden and the school compound in general.¹⁰⁵ Mobilizing resources to assist in establishing rain water harvesting systems could help in tackling the problem of lack of water.¹⁰⁶

It is important to note that the produce from the gardens can only complement and will not be sufficient on its own to sustain the SFP.³⁵ The Brazilian experience of establishing successful vegetable gardens in schools reports that to a great extent the success of the project depends on how enthusiastic and supportive the school principal/director is.⁸⁸

4.3.7 Delivery Systems of the School Feeding Program Ingredients

The finding of this study was that the SFP ingredients were mainly delivered to schools once per term. One participant recommended that the SFP ingredients should be delivered at the end of the previous term to avoid delays in delivery when the school term commences. However, leaving the SFP ingredients at the schools' store for a longer period of time of about a month, when schools close for holidays without using it, may increase the likelihood of food being infested with pest e.g. weevils and attacked by

rodents. Moreover, in slums people are food insecure and there is high occurrence of violent insecurity,¹⁰⁷ thus the schools may be exposed to burglary unnecessarily. Previously there have been instances where schools' stores have been broken into and school food stolen when schools closed for long holidays.¹⁰⁸

Logistical challenges may occur if the commodities were delivered in smaller quantities and more frequently i.e. it might not be cost-effective and delays in delivery may cause children to miss out on food or eat smaller portions.¹⁰⁹ In view of the fact that FTC prefers delivering the SFP ingredients quarterly when schools have opened, proper communication and coordination with the schools could enhance the effectiveness during delivery. For instance the schools could be informed at least a day in advance before the stock is delivered and members of the communities/teachers could be mobilized to provide security in unsafe areas.

4.3.8 Community Participation in the School Feeding Program

Even though most schools in this study involved members of their communities in various aspects of the SFP, the participants felt that parents were not contributing financially to assist in facilitating other supplementary services such as purchase of firewood and wages for food handlers. Strong community participation in the SFP found in this study is consistent with previous research that rates community involvement, in the SFP and other development programs, to be highest in Kenya when compared to other African countries such as Lesotho, Gambia and Malawi.²⁹

A study conducted in rural Kenya on school feeding showed that most school principals rated involvement of community members in the SFP as adequate.¹¹⁰ Recommendations by participants that FTC carry the costs involved in facilitating other supplementary services could lead to less community participation in the program. A case study from Uganda reported that when there is little community involvement in the SFP there is little ownership of the program by the community members.³⁵ Although there was a strong presence of community involvement in the current SFP, more could be done to enhance community participation. According to the participants, only slightly

more than a half of the community members in the school management committee participated in the SFP. Moreover, one in every five schools didn't have members of the community participating in other supplementary services such as providing money for purchase of firewood. More could be done to sensitize the teachers, parents and community members during the meetings of parent-teacher associations held each term, emphasizing the importance of supporting the SFP and the benefits of the SFP for enhancing their children's performance and development. The community members could support the program in terms of monetary and in-kind contributions, monitoring the program implementation, participating as cooks and in serving meals. It is noteworthy that increased community involvement in the SFP leads to effective implementation of the program and tends to enhanced educational quality¹¹¹ since teachers and students can focus on academic activities.

4.3.9 Availability of Infrastructure and Related Items Supporting Hygienic Food Preparation

Children from three-quarters of the schools were expected to provide their own utensils since only a quarter of the schools in this study provided plates and spoons. School feeding programs in South Africa also faces similar challenges of a lack of eating utensils for children^{30,112} in spite of the fact that the South African government and its partners actively donate utensils to schools through the National School Nutrition Program (NSNP).¹¹² The children, from FTC-sponsored schools, carry their eating utensils daily to and from home exposing them to a high risk of contracting food-borne disease due to possible microbial contamination during transportation. Other challenges faced when children provide their own eating utensils include: utensils of different quality (i.e. some are worn out), some plates/food containers are too small while others are too big and also most of the times the children have to share the utensils which also poses a health risk. Research done on a Brazilian feeding program reported that utensils could harbour a high load of microbes if not properly washed or if excessively worn out.¹¹³ To ensure all students have access to standard eating utensils, the government, NGOs and community members could be sensitized and mobilized to

share the costs involved. In Ghana's SFP, the community members cover 95% of the costs involved in purchasing and replacing utensils.¹¹⁴

4.3.10 Monitoring of the School Feeding Program

The finding in this study was that the SFP was regularly monitored both internally at the school level and externally by staff from FTC. Implementation of an efficient monitoring and evaluation (M & E) system is an important element in the SFP that has previously been found to be neglected often.¹¹⁵ Monitoring of the SFP involves input, outcome and process monitoring and it's crucial to ensure efficiency, accountability and transparency of program implementation.¹¹⁶ External monitoring of the SFP could be strengthened by paying increased attention to the schools and conducting more frequent school visits.¹¹⁷ Some of the participants in this study requested that the number of FTC staff monitoring the SFP be increased. Currently FTC staff monitors 20 schools on average per person and more staff will be able to monitor fewer schools more effectively.

Previous research evaluating monitoring of the SFP in sub-Saharan Africa reported that M & E of the program was only concerned with processes involved in implementation of the SFP and not conducting and monitoring children's nutritional status.¹¹⁸ Similarly in the current study, there was little objective monitoring of the nutritional status of children who were beneficiaries of the SFP. Continuous screening and nutrition assessment of the children would provide necessary data on whether the program is achieving one of its objectives i.e. improving nutrition outcomes of the children. There is a scarcity of valid information on how effective M & E systems of the SFP in developing countries are, and this necessitates developing and implementing efficient data gathering tools on the functioning and effectiveness of the SFP.¹¹¹

Ghana's case study of participatory monitoring of the SFP by Social Enterprise Development Foundation (SEND-Ghana) provides a good example of best practice of strengthening M & E systems in developing countries which could be adapted for Kenya's SFP. The SFP in Ghana was monitored by SEND-Ghana, which followed the following steps: signed a memorandum of understanding with Ghana's SFP secretariat,

partnered with civil societies, citizens and officials from the government, trained the partners concerning the SFP policy, developed data gathering tools and manuals and trained partners on M & E evidence gathering, used evidence gathered for policy advocacy, made follow-ups to ensure commitments were fulfilled, and publicised progress made concerning the SFP using different mass media channels.¹¹⁹

4.4 *Limitations in Infrastructure Availability and Commodities Supplied*

The schools in the current study had inadequate infrastructure in terms of equipment to be used for the SFP. Although water tanks and toilet facilities were present in all schools, there were limitations in terms of the ratio of the facilities per student population being served. Similarly, research done concerning the SFP in rural Kenya reported that inadequate infrastructure hindered the program from achieving its full potential.³⁴

It is imperative for optimising the impact and benefit derived from the SFP that investments are made in improvement of the school's infrastructure pertaining to food provision.³⁵ Previous research reports that communities in Ethiopia and Kenya around schools with the SFP, in socio-economically deprived areas, have been successfully mobilized to assist in improvements of the schools' infrastructure such as construction of more classes.⁹⁴ Thus the government, NGOs as well as communities, can form key partnerships in improving the infrastructure (e.g. contributing to assist schools acquire fuel-efficient stoves) to facilitate implementation of the SFP in the schools.

Similar to a study conducted in rural Kenya,¹¹⁰ the schools in this study had adequate space for storing food although they also lacked storage equipment, such as refrigerators, for perishable food items. This is an important consideration when contemplating expansion of the content of the SFP. Schools have the capacity for handling extra groceries, in addition to the current supply of the SFP ingredients, were they to be supplied to the schools, but would require additional funding for a refrigerated storage area as well as electricity supply. Alternatively, procurement of the perishable food items could be decentralized¹²⁰ so that after a successful tendering process

perishable commodities are supplied by community members. Cost-effective innovations for storing perishable commodities have also been developed by NGO's working in developing countries and are being used to benefit communities. Earthenware refrigerators also referred to as 'zeer pots' are examples of such innovations, and they comprise of a small clay pot placed inside a large clay pot with wet sand placed between the pots. The pots are designed to store fruits and vegetables and inside the pots the temperature is lower as a result of water evaporating from the wet sand. Assessment done concerning the effectiveness of the pots show that when perishable commodities such as tomatoes are stored in the pots, their shelf life is extended and they can be kept for 20 days compared to two days if they were out of the pot.¹²¹

The SFP ingredients supplied by FTC contributed to three food groups only in terms of food variety. The schools in this study were hardly able to compliment the SFP ingredients by providing food items from an additional food group to add to the quality of the nutrient intake. Schools relied heavily on donors for supply of the SFP ingredients, a finding consistent with previous research, reporting that one of the donors, World Food Program (WFP), was accountable for more than 70% of the costs of the SFP (used mainly in the purchase of commodities) in Kenya, Malawi and Gambia.²⁹

The above findings thus illustrate that there are gaps in terms of limited SFP infrastructure in schools. Moreover, there are also limitations with regards to the SFP ingredients supplied by the donors. Hence improving the schools infrastructure as well as the variety of ingredients supplied will go a long way in improving dietary diversity of food consumed by the children.

4.5 School Feeding Program in Formal and Non-Formal Schools

Comparisons of the SFP in formal and non-formal schools showed that the former had a greater number of children enrolled in the SFP and more availability of the infrastructure essential to facilitate hygienic food preparation. This finding could probably be attributed to the fact that formal schools are owned by the government and are allocated

considerable amounts of money during the annual budgetary processes.¹²² The formal schools thus have a greater ability to acquire more facilities.¹²³

There was a significant difference in the duration taken to prepare the SFP meals and in the time of initiation of the SFP meal during a school day between the formal and non-formal schools. More non-formal schools gave the first SFP meal to their children before 12:00 pm. The finding may be attributed to the fact that donors, communities and various sponsors actively fund the SFP in non-formal schools (to attract poor children from slums to the schools)¹²⁴ and the monetary contributions may be used to initiate an additional mid-morning snack.

The findings of this study also reported a significant difference in DDS between the formal and non-formal schools. Active funding of the SFP from other sources in non-formal schools, besides FTC, may also be a contributing factor to the higher score.¹²⁴ Similar to other studies conducted among school children in developing countries,^{125,126} it is likely that the children from FTC-sponsored schools had inadequate consumption of essential nutrients especially since the ingredients of the SFP were regarded to be poor in terms of diet quality.

4.6 *Strengths and Weaknesses of the Current School Feeding Program*

The strengths of the SFP were that it reached a big number of the children who were enrolled in the FTC-sponsored schools and there was a strong presence of community involvement in the program. The monitoring of the program was also a strong component with systems both internally and externally of the school.

The weakness of the SFP was that there was an apparent low level of nutritional knowledge among the participants and half of the participating schools lacked vegetable gardens. The schools also relied heavily on donors and the program would easily collapse if the donors pulled out. Moreover, the schools had limited infrastructure available for effective implementation of the SFP. There was also limited variety of SFP ingredients supplied by the donors.

In conclusion, various factors as described above influence the SFP and come into play in determining dietary diversity of the SFP. The finding of the study is that schools have a great potential of accommodating extra supplies of SFP ingredients. The program also heavily relies on donors and efforts should be made to encourage availability of additional food resources through promotion of agricultural production. Limited nutrition knowledge among the participants was a gap identified that needs investment in terms of time and resources.

CHAPTER FIVE: SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

5.1 Introduction

In this chapter, the key findings of this research will be summarized and the study limitations highlighted. Recommendations will also be made based on the results and discussions. The aim of the study was to determine the dietary diversity of the school feeding program (SFP), sponsored by Feed the Children (FTC), and to assess the factors (from the perspective of school principals/teachers in charge) that influence the SFP in urban slums of Nairobi, Kenya. The objectives of the study were: 1) to describe the perspectives of school principals/teachers in charge regarding factors influencing the SFP; 2) to describe the dietary diversity of the current SFP and outline whether the contributing factor leading to limitations regarding improved diet diversity of the SFP is due to unavailability of infrastructure or commodities supplied; 3) make comparisons of the SFP in formal and non-formal schools; and 4) identify the strengths and weaknesses of the current SFP.

5.2 Summary

Various factors which may limit the SFP from achieving its full potential and which also impact on dietary diversity that were investigated and which will be elaborated on include: the number of children benefiting from the program, duration of time taken to prepare the SFP food, food safety practices, timing and number of the SFP meals served. Other factors include the palatability of the food, variety of the SFP ingredients supplied, availability of additional food resources, delivery systems of the SFP ingredients, community involvement in the SFP, and the monitoring component of the SFP. Availability of infrastructure and related items supporting implementation of the SFP was investigated and limitations in infrastructure in relation to commodities supplied by donors were also described.

The findings of the research were that nearly all the estimated 50 000 children enrolled in schools whose SFP is supported by FTC in the slums of Nairobi, Kenya, participated in the SFP. Therefore, interventions done to improve the diet quality of the SFP could have a positive impact on a large population of children.

Most schools cooked the SFP food for a very long duration of time (mean of 12 hours) and significant differences were observed between formal and non-formal schools in the time taken to prepare the SFP meals. Various reasons may have contributed to the SFP ingredients taking longer time to cook: 1) quality of ingredients (poor quality commodities took a long duration; 2) quantity of the commodities being cooked; 3) type of commodities being prepared e.g. rice would take less time; 4) equipment used e.g. fuel-efficient stove or open fire; and 5) food preparation techniques i.e. soaking the ingredients before cooking. Literature recommends shortening the cooking time and conserving the environment through use of fuel-efficient stoves.

Most schools cooked their food overnight and the participants reported that their schools served the food warm. Nevertheless, observation made during data collection showed that little was done to reheat the food to a temperature of beyond 60 °C prior to serving of food as recommended by World Health Organization (WHO) to ensure food safety. Moreover, according to the participants, two out of every five food handlers did not have valid medical certificates at the time of data collection. The findings thus highlight a gap and a need for training of the food handlers on recommended food safety practices, hygienic preparation of meals, and methods of shortening the cooking time.

One participant believed the duration of time taken to prepare the SFP meal helped in nutrition retention. Furthermore, more than half of the participants believed that the SFP basket provided by FTC (constituting of maize, beans and oil) was nutritionally adequate to meet the daily nutritional requirements of the children. Based on the findings, a limitation in nutritional knowledge may be existing among the participants and there may be a need to further investigate the nutritional knowledge of participants, especially in relation to dietary diversity. Research previously conducted in Kenya reports that there is limited nutritional knowledge among Kenyan primary school teachers as a result of limited information resources, the narrow scope of nutrition topics covered in class, and little time for nutrition education allocated in the curriculum.

Few schools served their children the first SFP meal before 10:00 am and between 10:00 am to 12:00 pm, while in four out of every five schools, the first SFP meal was served very late in the day (between 12:00 – 14:00pm). However, more non-formal schools than formal schools initiated the SFP meal earlier in the day and significant differences were observed. The long duration of time taken to prepare the SFP food may have led to food being served very late in the day. Literature shows that more than 66 million children in the developing world go to school hungry. Thus initiating the SFP meal late in the day impairs their learning ability whereas having the program earlier in the day would help improve their short-term memory, cognition and concentration.

Most of the schools served their children one meal daily. Among the 14 schools that served their children two SFP meals, 12 schools were non-formal. Literature reports that non-formal schools are actively funded by donors, communities and various sponsors to attract and retain poor children to schools and the monetary contributions could be used to initiate an extra program such as a mid-morning snack.

More than a fifth of the participants reported that parents and children from the FTC-sponsored SFP had raised complaints regarding quality of the SFP ingredients (that it was unpalatable especially to the young children). Palatability of food could be increased by using innovative food preparation methods such as using different seasoning, using the same ingredients to cook different menu items, or combining different foods e.g. rice and maize. Practically FTC could substitute the tough maize with rice and/or conduct more training on food preparation techniques.

The average dietary diversity score (DDS), when counting nine food groups, in all the schools was less than four. Significant differences in DDS were observed between formal and non-formal schools. Non-formal schools had higher DDS probably due to monetary and in-kind contributions from other sources. The SFP ingredients (i.e. maize, beans and oil) from FTC comprised three food groups and the school children hardly consumed foods from the Vitamin A-rich fruits and vegetables group and also the

animal source food. Feed the Children could practically increase the variety of the SFP ingredients supplied e.g. by including dried and/or tinned vegetables.

The best way to include fresh vegetables in the SFP menu is by establishing vegetable gardens in schools. Half of the schools in this study lacked vegetable gardens. However, the majority of these schools had the potential to initiate the vegetable gardens and were interested in the project which could as well help in increasing the dietary diversity. Mixed opinions exist in literature concerning establishing vegetable gardens in schools. Some researchers believe it is time-consuming and an inappropriate use of the educational system, whereas evidence also exists of successful integration of school vegetable gardens with the school curriculum in developing countries.

Key among the challenges faced by the participants of these schools in initiating vegetable gardens includes lack of knowledge on agricultural production, lack of water, and insecurity. Establishing demonstration gardens in schools, where agricultural officers demonstrate as participants practically farm, could help bring together and transfer knowledge to teachers, school children and community members. Insecurity could be addressed by increased community ownership of school programs as well as by proper fencing. The problem of lack of water could also be addressed by mobilizing resources to harness rain water harvesting systems.

The finding of this study was that FTC mainly delivered the SFP ingredients in bulk three times a year (once in each school term). There were several delivery points depending on the security and school's accessibility. Among the challenges reported by participants regarding delivery of the SFP ingredients was the poor coordination i.e. the contact person from the schools were often caught unawares when the ingredients were delivered to schools. Proper communication and coordination with schools e.g. informing the school's contact person a day in advance regarding delivery date could help to increase effectiveness during delivery.

There was strong community involvement in the SFP in nearly all the schools. Members of the community participated in food preparation, served on the school management committee (SMC) and supervised the process of SFP implementation in the schools. In addition, some schools received donations of additional supplies of the SFP ingredients from community members. Members of the community were also involved in other supplementary services such as provision of money to be used for purchasing firewood, water and salt, as well as providing security overnight. Significant differences were also observed between formal and non-formal schools in the different levels of community participation. However, the participants reported that only two-thirds of the schools had members of the SMC being involved in the SFP. It is also noteworthy that nearly a quarter of the schools didn't have members of the community participating in the provision of other supplementary services such as monetary contributions to purchase firewood, salt, water and cover food handlers wages. Therefore, more needs to be done to involve the school management committee (SMC) in the SFP and parents in the provision of other supplementary services. More community members could participate in the SFP if they are sensitized during parent-teacher association meetings held each school term. Increased community participation has previously been associated with effective implementation of the program and increased education quality due to teachers having more time to focus on academics.

There was a strong monitoring and evaluation component both within the school administration and externally by FTC staff. The participants reported that they believed monitoring was efficient because the FTC staff visited the schools regularly and in unpredictable schedules. Moreover, the scope of monitoring done by FTC staff was wide-ranging from the school's store, school's records to food preparation in the kitchen. Developing data gathering tools to monitor the impact of the SFP on child outcomes e.g. conducting nutrition assessments is a potential area for improvement that could be considered by FTC. Monitoring could also be improved by having a more participatory approach in also including the members of the community. Ghana provides a good case study of the participatory approach in monitoring of the SFP in which a partnership of the government, non-governmental organizations (NGOs) and community members

after a thorough training on monitoring of the SFP, gathered data that was used for policy advocacy.

Regarding infrastructure and related items supporting hygienic food preparation, all the schools had extra storage space for groceries, fruits and vegetables. Observations made at the schools supported this, although there was a general lack of equipment (such as refrigerators) to store perishables for a longer period. All schools had water tanks, toilet facilities as well as adequate personnel (food handlers). The items that were missing in the schools, in varying proportions, include: availability of electricity, presence of energy-saving *jiko* (fuel-efficient stove), functioning hand washing facilities (water tap with sink and soap), buckets for serving food, and eating utensils for the children. Generally, the schools did not have sufficient infrastructure to facilitate smooth implementation of the SFP in schools. The top priority infrastructure improvements that the participants believed their schools need most were as follows: a dining hall, an energy saving *jiko* (fuel-efficient stove), a water tank, and hand washing facilities.

Four out of every five schools did not have eating utensils and expected the children to provide for themselves. This would expose the children to a high risk of microbial contamination, especially since the eating utensils they would bring from home would be of varying quality and may not be washed properly. It is thus necessary to sensitize and mobilize resources from the government, NGOs and community members to purchase and maintain standard eating utensils.

The finding of the study, with regards to whether the limitations in DDS was due to limitations in infrastructure or donor supplies, was that there was a limitation in both the variety of SFP ingredients supplied by the donors and the available infrastructure supporting implementation of the SFP in the schools. It is imperative for optimising the impact and benefit derived from the SFP, that investments are made to improve the schools' infrastructure pertaining to food provision. Since the program also relied heavily on donor support, the donors could be sensitized to consider improving the variety of the SFP ingredients supplied to the schools.

5.3 Recommendations

Based on these study findings, it is recommended that:

- Efforts by FTC are geared to improving the quality of the SFP ingredients being supplied to the schools. This could be achieved by making recommendations to the supplier of the commodities and double-checking the quality before purchasing.
- Variety (both within and among the different food groups) of the SFP ingredients supplied by the donors should be increased. It could be achieved by allocating more funds to purchase a wide range of food stock or assisting the schools with a vegetable garden project.
- The schools without the vegetable garden project should also be assisted by a joint collaboration of the government, NGOs and the community members to start the project.
- Schools should be encouraged to initiate the SFP meal early in the school day. This could be done through a government policy setting recommendations on the time to serve the first SFP meal on a normal school day.
- Input of nutritional professionals, such as having nutritionists playing a leading role in knowledge transfer to the program beneficiaries, should be incorporated into the SFP.
- Nutrition education should be integrated with the school curriculum and teacher training should also be conducted by a joint collaboration of FTC and the government.
- Training of the food handlers on food preparation and food safety recommended practices should also be done more frequently and enforced continually.
- The schools should also be assisted by the government, NGOs and the community with infrastructure improvements and also in purchasing and maintaining eating utensils.

- The monitoring and evaluation component of the SFP, both within the school level and also by the FTC staff, should also be strengthened and data gathering tools developed.

Recommendations for further study

- A similar study to be conducted evaluating opinions of parents and children regarding improving the diet diversity and the SFP.
- A study to be conducted evaluating the knowledge, attitude and practices of parents, teachers and children regarding nutrition.
- A study to be conducted evaluating the daily dietary practices of the children both in schools and at home with an aim to highlight the children's nutritional needs and advocate for improvements in SFP to help the children meet their daily nutritional requirements.

5.4 *Limitations of the Study*

- The study mainly concentrated on the urban slums of Nairobi, Kenya and thus the findings could not be generalized to other environments.
- The teachers might have given a positive opinion because they might be afraid that a negative opinion could have led to their school being victimized despite assurances to maintain anonymity and confidentiality.
- Due to study design, time and cost constraints, opinions of teachers only were sought and this could have given a limited view compared to if parents and children were included in the interviews. Qualitative research methods were also not used due to the above constraints and this could have enriched the study findings.

5.5 *Significance of the Research*

The findings and recommendations will be forwarded to the SFP personnel: the FTC, City Education Department (CED) and the participating schools. The data obtained from the research will add to the dearth of information comparing dietary diversity and factors affecting SFP in developing countries. Findings will be published in a peer-reviewed,

accredited scientific journal and presented at a scientific congress. It will also inform policy and practice of the SFP.

The significance of the study is in its contribution to the wealth of information concerning the SFP practice in the developing countries, areas that need improvements and gaps for further research. The research findings brought to light that the diet quality (whose proxy indicator is diet diversity) of the SFP in developing countries is still poor. It brought to view the food groups that the school children need to improve their nutrient intake. Infrastructure and related items supporting the SFP, which the schools lack and the priority with which they would wish to be supported, was also highlighted.

From the research findings, the strengths of the SFP sponsored by FTC were the big number of the children beneficiaries, greater community involvement in the SFP and the strong monitoring component of the SFP, with systems both internally and externally of the school. The weakness of the SFP was that there was apparently a low level of nutritional knowledge among the participants, lack of school vegetable gardens and heavy reliance on donor support for program implementation. Moreover, limited availability of infrastructure supporting the SFP and limited variety of SFP ingredients supplied by the donors were also among the weaknesses observed.

The information from the research could be used by the government, non-governmental organizations/donors (FTC), community members, schools and any potential investors in the SFP. It could be used to lobby for funds to improve on the variety of SFP ingredients supplied. It also provides information to investors on specific infrastructure and related items supporting hygienic food preparation that the schools needs. The information could also be used to provide a basis for policy advocacy in terms of improvements in timing of the SFP meal and the need for nutrition education in primary schools. It also highlights gaps and areas that need further research.

5.6 Conclusion

Whereas conducting the SFP is noble and helps to provide daily life's essentials to thousands of children who would otherwise go hungry, have impaired concentration/learning ability and as a result minimal chances of breaking from the cycle of poverty, various limitations hinder the program from achieving its full potential. The current study evaluated and elaborated on factors affecting the SFP which also impact on dietary diversity from the perspectives of the school principals/teachers. Limitations as a result of unavailability of infrastructure in the schools and commodities supplied by the donors were outlined. Comparisons of the SFP in formal and non-formal schools were also made and strengths and weaknesses of the current SFP identified. Interventions to support schools in provision of a more varied diet and improving infrastructure would help to improve the diet quality of the children. The potential areas for focus to improve the SFP and also the diet diversity include implementing nutrition education in the schools and promoting agricultural production.

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ADDENDA

Addendum 1

Solomon M Ogachi,
P.O. Box 1563-20100,
Nakuru,
Kenya.
26th May 2014.

Feed the children-Kenya (FTC) / City education department (CED),
Nairobi,
Kenya.

Research Title: Dietary Diversity of the School Feeding Program and factors influencing the School Feeding Program in the slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.

To whom it may concern,

RE: SCHOOL FEEDING PROGRAM (SFP) RESEARCH

The above named person is a postgraduate student at the University of Stellenbosch (South Africa) pursuing Master in Nutrition and would like to conduct research on SFP as titled above. The research is aimed at determining the dietary diversity of the SFP, sponsored by Feed the Children, and to assess the factors (from the perspective of school principals/teachers in charge) that influence the SFP in urban slums of Nairobi, Kenya. The research will thus outline the existing gaps and/or challenges faced in running a SFP and make scientific evidence based recommendations.

Once permission to conduct the study has been obtained from FTC and CED, the principals will be given consent forms to sign and a date for conducting the interviews will be scheduled. All the principals/teachers in charge from all the 78 schools in Nairobi whose SFP is supported by FTC will be interviewed using a SFP evaluation questionnaire during school hours in their respective schools in the month of September

and October 2014. A research assistant will concurrently go round the school to fill an observation checklist as the interviews are being carried on.

The SFP evaluation questionnaire will probe on the current SFP practice in terms of percentage of pupils participating in the SFP, participant's opinion on the adequacy of the type and amount of food eaten, food delivery system, availability of infrastructure for the SFP, availability of food, participant's perspectives on the impact of SFP on enrolment/attendance, problems experienced while running the SFP and suggestions on how to improve the SFP. The observation checklist will on the other hand probe different aspects of the SFP such as food delivery, infrastructure available at the school, food availability, food service and food safety.

The names of the participants will be kept anonymous and all procedures to obtain ethics approval will be strictly adhered to. The data obtained will be analyzed using relevant statistical packages and results communicated to the relevant authorities', including the schools, FTC and CED, managing the SFP.

Any assistance accorded him will be highly appreciated.

Yours Faithfully,

Solomon Ogachi

Addendum 2

NAIROBI CITY COUNTY



Telegraphic Address
Email: info@nairobi.go.ke
Web: nairobi.go.ke

CITY HALL ANNEXE:
P. O. BOX 30298 GPO- 00100,
NAIROBI, KENYA

EDUCATION, CHILDREN & YOUTH AFFAIRS SECTOR

REF: GL/NC/295 VI/44

11th September, 2014

**All Headteachers
Feed the Children/SFP Schools
NAIROBI**

RE: SCHOOL FEEDING PROGRAMME (SFP) RESEARCH

Mr. Solomon M. Ogachi has been working with Feed the Children. He is doing research for his Masters in Human Nutrition – under the auspices of Feed the Children. The findings of the research is geared towards improvement of the implementation of the programme.

Kindly accord him all the necessary support and cooperation.

**MWANTHI A.N.
CHIEF OFFICER – EDUCATION, CHILDREN AND YOUTH AFFAIRS**

**C.C. All Section Heads
All MEOS**

Addendum 3



11th September 2014.

TO WHOM IT MAY CONCERN,

RE: SCHOOL FEEDING RESEARCH APPROVAL.

Following the receipt of letter dated 26/5/2014 requesting permission to collect data on Project titled "Factors that influence dietary diversity of school feeding programs in slums of Nairobi, Kenya: A perspective of school principals/ teachers in charge" by Solomon Ogachi, Feed the Children grants you the approval to collect the data in the schools' it sponsors in Nairobi on condition that the results of information gathered will be communicated back to the organization.

For any further assistance use the undersigned contacts.

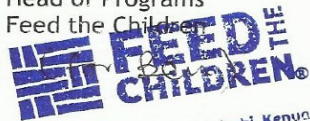
This letter is valid for one year, i.e. until 10th September 2015.

We wish you all the best in your endeavors.

Yours Faithfully,

A handwritten signature in black ink, appearing to read "Ben Mbaya".

Ben Mbaya
Head of Programs
Feed the Children



P.O. Box 61530-00200 Nairobi, Kenya.
Tel: +254 20 3504229 / 2124829
www.feedthechildren.org

P.O. Box 61530-00200, Nairobi, Kenya. Tel: +254-20-2124829 / +254 20 3504229, Mobile: 0722 202958/9

E-mail: info@feedthechildren.co.ke, www.feedthechildren.org

Addendum 4

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR USE BY SCHOOL PRINCIPAL/TEACHER IN CHARGE

TITLE OF THE RESEARCH PROJECT: Dietary Diversity of the School Feeding Program and factors influencing the School Feeding Program in the slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.

REFERENCE NUMBER:

PRINCIPAL INVESTIGATOR: SM Ogachi

ADDRESS: P.O. Box 61530-00200
Nairobi

CONTACT NUMBER: 0720903878

You've been invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you will be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you or your school negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do initially agree to take part.

This study has been approved by the **Health Research Ethics Committee of the Faculty of Medicine and Health Sciences at Stellenbosch University** (South Africa) and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

The study has been funded by Stellenbosch University Rural Medical Education Partnership Initiative (SURMEPI) and there is no conflict of interest.

- **What is this research study all about?**

- *The aim of the research is to determine the dietary diversity of the SFP, sponsored by Feed the Children (FTC), and to assess the factors (from the perspective of school principals/teachers in charge) that influence the SFP in urban slums of Nairobi, Kenya. Thus you will be asked to fill out a SFP evaluation questionnaire via the researcher dealing with perspectives such as children's satisfaction with the portion of food, availability of additional food resources, availability of infrastructure and related items supporting the SFP, experiences during delivery of food and challenges and recommendations on ways to improve SFP. The interview will take a duration length of about 1 hour. During the interview period, a research assistant will be going round your school completing an observation form on aspects such as school's infrastructure, availability of food, food delivered and the school's menu.*

- **Why have you been invited to participate?**

- *Your school is among the 78 SFP beneficiary schools in Nairobi supported by Feed the Children (FTC) and in each of these schools at least one person's (the principal/teacher*

in charge) input is required in order to highlight the current SFP practice and factors that influence dietary diversity.

- **What will you benefit from taking part in this research?**
 - *There will be no personal benefits given, however your input will be very invaluable in providing a basis to inform the personnel of the SFP.*
- **Are there any risks involved in taking part in this research?**
 - *There are no possible risks foreseeable and all information will be kept private and confidential.*
- **If you do not agree to take part, what alternatives do you have?**
 - *You can withdraw from the study at any point you wish to withdraw without any consequences.*
- **Who will have access to the information you provide?**
 - *The information from the research will only be shared among the researchers, study monitors or auditors and you and your school's privacy is assured. Key findings will also be reported in a general manner i.e. schools will be classified in terms of their geographic boundaries (divisions) and whether they are formal or non-formal this will be among the measures taken to protect your identity and that of the school.*
- **Will you be paid to take part in this study and are there any costs involved?**
 - *There will be no costs incurred by you or your school if you agree to take part in the research and no money will be paid to participate.*
- **Is there anything else that you should know or do?**
 - You can contact Mr **Solomon Ogachi** at tel **0720903878** if you have any further queries or encounter any problems.
 - You can contact the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Stellenbosch University (South Africa) at +27 +21-938 9207 and/or Ethics Review Committee of Kenyatta university at +254 20 8710901-19 if you have any concerns or complaints that have not been adequately addressed by the researchers.
 - You will receive a copy of this information and consent form for your own records.
- **Declaration by principal/teacher in charge**

By signing below, I (name of principal/SFP teacher in charge) agree to take part in a research study entitled *Factors that influence the dietary diversity of school feeding programs in slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.*

I declare that:

- I have read or had read to me this information and consent form and that it is written in a language with which I am fluent and comfortable.

- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to withdraw from the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished if the study researcher feels it is in my best interests.

Signed at (*place*) on (*date*)2014

.....
Signature of principal/teacher in charge

.....
Signature of witness

• **Declaration by investigator**

I (*name*) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understand all aspects of the research, as discussed above
- I did/did not use an interpreter (*if an interpreter is used, then the interpreter must sign the declaration below*).

Signed at (*place*) on (*date*) 2014.

.....
Signature of investigator

.....
Signature of witness

Addendum 5

School feeding program evaluation questionnaire

Research Title: Dietary Diversity of the School Feeding Program and factors influencing the School Feeding Program in the slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.

Research number allocated.....

Date of data collection.....

1. Are you the principal or teacher in charge (tick one)?
Principal ☐ Teacher in charge ☐
2. What is your gender?
Male ☐ Female ☐
3. Which of the following divisional boundaries is your school located (please tick one)?

a) Dagoretti <input type="checkbox"/>	f) Langata <input type="checkbox"/>
b) Dandora <input type="checkbox"/>	g) Makadara <input type="checkbox"/>
c) Embakasi <input type="checkbox"/>	h) Starehe <input type="checkbox"/>
d) Kamkunji <input type="checkbox"/>	i) Umoja <input type="checkbox"/>
e) Kasarani <input type="checkbox"/>	j) Westlands <input type="checkbox"/>
4. How would you classify your school (please tick one)?
Formal ☐ Non-formal ☐
5. What is your role/responsibility in terms of the SFP at your school?

Structure and management of the SFP

6. What is the current enrolment of children in your school?

7. What number and percentage of the children in your school feed from the SFP food basket?

8. When are the children included/ excluded from feeding from the SFP?

8.1. Who makes that decision?

9. Approximately how long does it take between placing food at the stove to cook and the time it's fully cooked:hours

9.1. What is the reason behind the length of time it takes to cook your food?

10. What is the average number of children who receive a meal of the SFP food basket at your school per day?

11. When do the children receive the first SFP food in your school (please tick one):

- a) Before 10:00 am ☐
- b) Between 10:00 am and 12:00 pm ☐
- c) After 12:00 pm ☐
- d) Other ☐ (please specify)

11.1. Why did your school decide on the above timing?

12. How many days a week do the children receive the SFP food:

- a) 1 day a week ☐
- b) 2 days a week ☐
- c) 3 days a week ☐
- d) 4 days a week ☐
- e) 5 days a week ☐
- f) It varies depending on availability of food ☐

Children's satisfaction with the portion of food:

13. Do you think the amount of food given to the children satisfies them?

- a) Yes ☐
- b) No ☐
- c) Don't know ☐

13.1. What is the reason behind your answer?

14. Do you think the children enjoy the food and find it tasty?

- a) Yes ☐
- b) No ☐
- c) Don't know ☐

14.1. What is the reason behind your answer?

15. Do you think the food is nutritious enough to satisfy the daily needs of the children?

- a) Yes ☐
- b) No ☐
- c) Don't know ☐

15.1. If yes, what is the reason behind your answer?

15.2. If not, how could the food be improved to meet the children's daily needs?

16. Do you think the food is well prepared/cooked well?

- a) Yes ☐ b) No ☐ c) Don't know ☐

16.1. What is the reason behind your answer?

17. Have the children raised any complaints regarding the food they eat?

- a) Yes ☐ b) No ☐ c) Don't know ☐

17.1. If yes, what were these complaints?

18. Have the parents raised any complaints regarding the food given to their children?

- a) Yes ☐ b) No ☐ c) Don't know ☐

18.1. If yes, what were these complaints?

Delivery and packaging of the SFP ingredients:

19. Do you think food is well packaged?

- a) Yes ☐ b) No ☐ c) Don't know ☐

19.1. Do you think it should be improved?

- a) Yes ☐ b) No ☐ c) Don't know ☐

19.2. If no, how can it be improved?

20. Do you think the food is well labelled?

- a) Yes ☐ b) No ☐ c) Don't know ☐

20.1. Do you think it should be improved?

- a) Yes ☐ b) No ☐ c) Don't know ☐

20.2. How can it be improved?

21. When is food delivered to your school (please tick one)?

- a) At the beginning of school term ☐
b) In the mid of the school term ☐
c) When stocks are over at the store ☐
d) Other ☐ (please specify)

22. What kinds of foods are delivered to your school as the SFP food basket? Please list all.

23. Where is the normal delivery point of SFP food for your school?

24. Who receives the food upon delivery?

25. Where is the food stored after delivery?

26. Do you think the right amount of food is delivered?
 a) Yes ☐ b) No ☐ c) Don't know ☐

26.1. Do you think it should be improved?
 1. Yes ☐ b) No ☐ c) Don't know ☐

26.2. If no, how can it be improved?

27. Do you think the food is delivered on time?
 a) Yes ☐ b) No ☐ c) Don't know ☐

27.1. Do you think it should be improved?
 a) Yes ☐ b) No ☐ c) Don't know ☐

27.2. If no, how can it be improved?

28. Has your school ever experienced any of the following?

28.1. Non-delivery of food;
 a) Yes ☐ b) No ☐ c) Don't know ☐

28.2. Substitution of certain food due to non-delivery of the required food;
 a) Yes ☐ b) No ☐ c) Don't know ☐

28.3. If no, Please specify

29. What other challenges does your school face regarding delivery of food?

29.1. What recommendations would you make to improve it?

Community involvement:

30. Is anybody from the community involved in any area of the SFP at your school?
 a) Yes ☐ b) No ☐ c) Don't know ☐

30.1. If Yes, in which of the following area(s):

- a) In food preparation ☐
- b) In school management committees ☐
- c) In overall supervision of SFP ☐
- d) In supply of SFP food ☐
- e) Other ☐ please specify.....

31. Who among the following categories of community members is involved in the SFP?

- a) Parents ☐
- b) Religious groups ☐
- c) Local businesses ☐
- d) Local government ☐
- e) Other ☐ please specify.....

Availability of the SFP infrastructure and related items:

32. Is the following available at the school:

32.1. Additional storage space for groceries
 a) Yes ☐ b) No ☐ c) Don't know ☐

32.2. Additional storage space for fresh fruit and vegetables
 a) Yes ☐ b) No ☐ c) Don't know ☐

32.3. Space for cold storage of perishable food

- a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.4. Space for storage of frozen food items
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.5. Working refrigerators
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.6. Working fuel-efficient stove (energy-saving *jiko*)
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.7. Working microwave
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.8. Toilet facilities
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.9. Hand wash basins with water and soap
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.10. Potable Water
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.11. Electricity
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.12. Adequate personnel
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.13. Serving buckets with lids
a) Yes ☐ b) No ☐ c) Don't know ☐
- 32.14. Children's Plates/spoons
a) Yes ☐ b) No ☐ c) Don't know ☐

33. Do you think there are any necessary infrastructure/facilities that would facilitate smooth running of the SFP which your school currently lacks?

a) Yes ☐ b) No ☐ c) Don't know ☐

33.1. If yes, please list down the facilities in order of priority

- 1) _____
2) _____
3) _____

34. Do you have any noted recommendations and/or observations that you would like to make concerning your school with regards the 'infrastructure and related items'?

Availability of additional food resources

35. Does the school have a vegetable garden?

a) Yes ☐ b) No ☐ c) Don't know ☐

35.1. If yes, how can it be improved?

35.2. If not, why not?

36. If your answer is **no** in question 35 above, please answer the following questions. If your answer was **yes** to question 35, please proceed to question 37 below.

36.2. Is there a suitable space for a vegetable garden project in your school?

a) Yes ☐ b) No ☐ c) Don't know ☐

36.3. Would your school be interested in a vegetable garden?

a) Yes ☐ b) No ☐ c) Don't know ☐

36.4. If not, why not?

37. What are some of the challenges your school faces/is likely to face in carrying out a vegetable garden project?

38. Are there other feasible livelihoods projects that can be implemented in your school to increase food availability? Please explain.

Food Preparation:

39. Who is responsible for preparing the SFP food (please tick one)?

- a) Employed cooks ☐
- b) Community volunteers ☐
- c) Children's parents ☐
- d) Other ☐ (please specify).....

40. Where do they prepare the food?

41. What cooking method(s) is/are used to prepare the food?

- a) Boiling ☐
- b) Roasting ☐
- c) Frying in oil ☐
- d) Other ☐ (please specify).....

42. At what time is the food ready to be served?

Food service

43. Where do the children eat the SFP food (please tick one)?

- a) In their respective classes ☐
- b) In the school dining hall ☐
- c) In the open field ☐
- d) Other ☐ (please specify).....

44. Do they wash their hands before they eat?

45. How long does it take to serve the whole school with food on daily basis (please tick one)?

- a) Less than 30 minutes ☐
- b) 30minutes - 1 hour ☐
- c) More than 1 hour ☐
- d) Other ☐ (please specify).....

46. How long does it take for all children to complete eating the SFP food on each school day?

- a) Less than 30 minutes ☐
- b) 30 minutes - 1 hour ☐
- c) More than 1 hour ☐
- d) Other ☐ (please specify).....

47. Is there food that is leftover?

- a) Yes ☐
- b) No ☐
- c) Don't know ☐

47.1. If yes, what happens to the leftover food?

Food safety

48. Who is responsible for serving the food?

- a) The cooks ☐
b) The class teachers ☐
c) The children themselves ☐
d) Other ☐ (please specify).....

49. Did food handlers receive any training in food safety?

- a) Yes ☐ b) No ☐ c) Don't know ☐

49.1. If so, was the training sufficient?

- a) Yes ☐ b) No ☐ c) Don't know ☐

49.2. How can it be improved?

50. Have the food handlers in your school undergone medical check-up within the last six months?

- a) Yes ☐ b) No ☐ c) Don't know ☐

50.1. If yes, what facility did they go to?

50.2. If not, why not?

51. Do the food handlers in your school have a valid (that has not expired) medical certificate?

- a) Yes ☐ b) No ☐ c) Don't know ☐

51.1. If yes, when does it expire?

51.2. If not, why not?

52. Do you have facilities to keep warm food warm until consumption?

- a) Yes ☐ b) No ☐ c) Don't know ☐

52.1. What are these facilities?

52.2. Do you think the above method(s) can be improved?

- a) Yes ☐ b) No ☐ c) Don't know ☐

52.3. If yes, how do you think these can be improved?

Monitoring of the SFP

53. Is there any internal system within your school that has been implemented to monitor the SFP?

- a) Yes ☐ b) No ☐ c) Don't know ☐

53.1. If yes, would you briefly describe how you conduct monitoring in your school?

53.2. If not, why not?

53.3. How can internal monitoring of the SFP food at your school be improved?

54. Do you think SFP monitoring by FTC staff is efficient?

a) Yes ☐

b) No ☐

c) Don't know ☐

54.1. If yes, please explain your answer?

54.2. If not, why not?

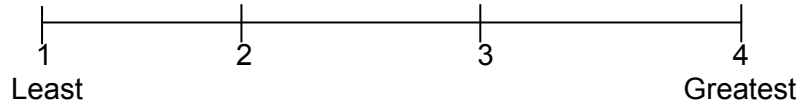
54.3. How can monitoring of the SFP by FTC staff be improved?

Perceived impact of SFP

55. How would you rate the role of SFP in your school towards the following factors (where 1 represent least impact and 4 the greatest impact)?

NB: At each question, make a circle on the line to indicate your choice.

55.1. Increase in enrolment of learners at the school



55.1.1. Please explain your answer?

55.2. Increase in daily attendance and decreased absenteeism of school by learners



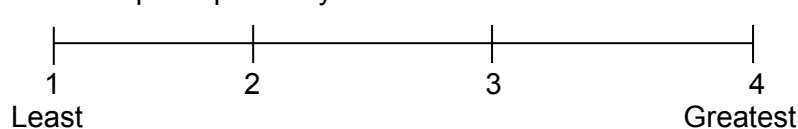
55.2.1. Please explain your answer?

55.3. Improved participation by learners in the classrooms, increased intellectual ability and increased attentiveness?



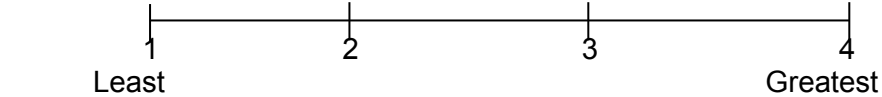
55.3.1. Please explain your answer?

55.4. Increased social participation by learners



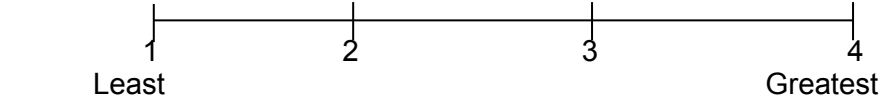
55.4.1. Please explain your answer?

55.5. Increased physical participation in extracurricular activities by learners



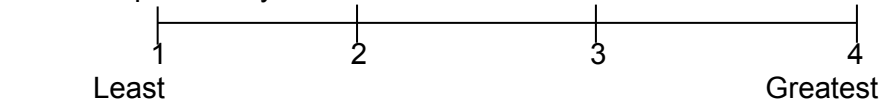
55.5.1. Please explain your answer?

55.6. Improved health



55.6.1. Please explain your answer?

55.7. Increased punctuality



55.7.1. Please explain your answer?

Additional SFP ingredients that could be added to the current SFP

56. Which of the following food items would be most beneficial to the children if it would be added to the current SFP food basket?

- a) Milk ☐
- b) Vegetables ☐
- c) Fruits ☐
- d) Other ☐ (please specify).....

57. Which of the following food items can the school most comfortably accommodate in terms of storage was it to be added to the current SFP food basket?

- a) Milk ☐
- b) Vegetables ☐
- c) Fruits ☐
- d) Other ☐ (please specify).....

58. Do you have any other suggestions on how to improve the SFP?

59. Would you kindly describe the school menu in the table below; (also attach a copy of the school menu if available)

	Mid-morning snack: menu items	Ingredients used for mid-morning snack	Lunch: menu items	Ingredients use for cooking lunch	Mid afternoon snack: menu items	Ingredients used for mid afternoon snack
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						

Addendum 6

School feeding program evaluation observation form

Research Title: Dietary Diversity of the School Feeding Program and factors influencing the School Feeding Program in the slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.

Research number allocated.....

Date of data collection.....

1. Divisional boundary where the school located (please tick one)

- a) Dagoretti ☐
- b) Dandora ☐
- c) Embakasi ☐
- d) Kamkunji ☐
- e) Kasarani ☐
- f) Langata ☐
- g) Makadara ☐
- h) Starehe ☐
- i) Umoja ☐
- j) Westlands ☐

2. School type

Formal ☐

Non-formal ☐

Structure and management of the SFP

3. Number of daily meals children receive from SFP:

4. Time of first SFP food:

- a) Before 10:00 am ☐
- b) Between 10:00 am and 12:00 pm ☐
- c) After 12:00 pm ☐
- d) Other ☐ (please specify)

5. No of days per week that the children receive the SFP food:

- a) 1 day a week ☐
- b) 2 days a week ☐
- c) 3 days a week ☐
- d) 4 days a week ☐
- e) 5 days a week ☐
- f) Not observed ☐

Delivery and packaging of the SFP ingredients

6. Presence of properly packaged food at the school store
a) Yes ☐ b) No ☐
 7. Presence of clearly labelled food in the store
a) Yes ☐ b) No ☐
 8. Any noted observations/recommendation
-
-

Availability of the SFP infrastructure and related items:

9. Observe and tick appropriately if the following is available at the school:
 - 9.1. Additional storage space for groceries
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.2. Additional storage space for fresh fruit and vegetables
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.3. Space for cold storage of perishable food
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.4. Space for storage of frozen food items
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.5. Working refrigerators;
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.6. Working fuel-efficient stove (energy-saving *jiko*)
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.7. Working microwave
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.8. Toilet facilities
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.9. Hand wash basins with water and soap
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.10. Water
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.11. Electricity
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.12. Adequate personnel
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.13. Serving buckets with lids
a) Yes ☐ b) No ☐ c) Don't know ☐
 - 9.14. Children's Plates/spoons
a) Yes ☐ b) No ☐ c) Don't know ☐
 10. Any noted recommendations and/or observations made regarding infrastructure;
-
-

Availability of additional food resources

11. Availability of a functioning school vegetable garden
a) Yes ☐ b) No ☐
12. Available space at the school for implementing a vegetable garden
a) Yes ☐ b) No ☐

Food service

13. Where children eat the SFP food (please tick one)
 - a) In their respective classes ☐
 - b) In the school dining hall ☐
 - c) In the open field ☐
 - d) Other ☐ (please specify).....

14. Children wash hands before eating
a) Yes ☐ b) No ☐
15. Time taken to serve the whole school with food on daily basis (please tick one):
a) Less than 30 minutes ☐
b) 30 minutes - 1 hour ☐
c) More than 1 hour ☐
d) Other ☐ (please specify)
16. Time taken by children to complete eating SFP food per day
a) Less than 30 minutes ☐
b) 30 minutes - 1 hour ☐
c) More than 1 hour ☐
d) Other ☐ (please specify)
17. Presence of leftover food after children have eaten the SFP food
a) Yes ☐ b) No ☐
18. Any noted observations/recommendations made regarding food distribution
-
-

Food Safety

19. Person serving the SFP food
a) The cooks ☐
b) The class teachers ☐
c) The children themselves ☐
d) Other ☐ (please specify).....
20. Food handlers with valid medical certificate
a) Yes ☐ b) No ☐
21. Any noted observations/recommendations made regarding food safety
-
-

Additional SFP ingredients (the menu)

22. Copy from the menu the meal items planned for today. Then compare the actual food served to the planned menu.

Observation day of the week;	Mid-morning snack: menu items	Ingredients used for mid morning snack	Lunch: menu items	Ingredients use for cooking lunch	Mid afternoon snack: menu items	Ingredients used for mid afternoon snack
Meal planned						
Actual meal served						

23. Compare the actual menu with the principal's version of the menu. Is the principal's version accurate?

a) Yes ☐

b) No ☐

23.1. If no, summarize the differences _____

Addendum 7



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Approval Notice New Application

05-Sep-2014
OGACHI, Solomon

Ethics Reference #: S14/04/083

Title: Factors that influence the dietary diversity of school feeding programs in slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.

Dear Mr Solomon OGACHI,

The New Application received on 17-Apr-2014, was reviewed by members of Health Research Ethics Committee 1 via Expedited review procedures on 05-Sep-2014 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Period: 05-Sep-2014 -05-Sep-2015

Please remember to use your **protocol number** (S14/04/083) on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note a template of the progress report is obtainable on www.sun.ac.za/rds and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Translation of the consent document to the language applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372

Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwc.gov.za Tel: +27 21 483 9907) and Dr Helene Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and documents please visit: www.sun.ac.za/rds

If you have any questions or need further assistance, please contact the HREC office at 0219389657.

Addendum 8



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke
ercku2008@gmail.com
Website: www.ku.ac.ke

P. O. Box 43844 - 00100 Nairobi
Tel: 8710901/12
Fax: 8711242/8711575

Our Ref: KU/R/COMM/51/379

Date: 30th October, 2014

Solomon Mosomi
Stellenbosch University (South Africa),
P.O Box 19063, Tygerberg – 7505, SA.

Dear Mosomi,

RE APPLICATION NUMBER PKU/224/E 26 – “FACTORS THAT INFLUENCE DIETARY DIVERSITY OF SCHOOL FEEDING PROGRAMS IN SLUMS OF NAIROBI, KENYA: A PERSPECTIVE OF SCHOOL PRINCIPALS/TEACHERS IN CHARGE.”

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic “Factors that influence dietary diversity of school feeding programs in slums of Nairobi, Kenya: A perspective of school principals/teachers in charge.” received on 1st October, 2014.

2. APPLICANT
Solomon Mosomi

3. STUDY SITE
Nairobi, Kenya

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 30th October, 2014.

5. ADVICE/CONDITIONS
- Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
 - Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
 - Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
 - Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I Solomon Mosomi Ogarhi accept the advice given and will fulfill the conditions therein.

Signature: [Signature] Dated this day of 7/11/2014 2014.

cc. Vice-Chancellor



Addendum 9



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

28th November, 2014

NACOSTI/P/14/9835/3857

Solomon Mosomi Ogachi
Stellenbosch University
SOUTH AFRICA.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Factors that influence dietary diversity of school feeding programs in slums of Nairobi, Kenya: A perspective of school principals/ teachers in charge,”* I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for a period ending **31st December, 2015**.

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


DR. S. K. LANGAT, OGW
FOR: SECRETARY/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. Box 30124-00100, N2
TEL: 341666

